

AMERICAN JOURNAL OF OPHTHALMOLOGY

Medical Lib

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AMERICAN JOURNAL OF OPHTHALMOLOGY

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SOME AFTER-THOUGHTS ON TREPHINING FOR GLAUCOMA

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LONDON

The technique of the operation is again briefly reviewed and the rationale of each step explained. The wide angled conjunctival flap of maximum thickness; splitting of the cornea and not cutting into it; a 2 millimetre trephine opening half on cornea and half on sclera; a small iridectomy leaving the trephine opening iris free; the continuous suture for closing the conjunctival wound. The points in technique especially emphasized. Some of the complications of the operation are mentioned and methods of prevention and treatment suggested. The author draws upon his rich experience in handling difficult cases of glaucoma for many practical suggestions.

Twenty-two years ago, in August, 1909, after very careful thought and after weighing the pros and cons for over two years, I ventured to perform the first sclerocorneal trephining for glaucoma. It was twenty-one years ago since I first described the operation in England. In the early years following this I wrote a number of papers as well as four textbooks on the subject of glaucoma, and I twice visited the United States, and demonstrated my method at a large number of centers. I can never forget the kindness I received there, and the desire on the part of all I had the pleasure of meeting, to hear what I had to say and to give sclerocorneal trephining a fair and exhaustive trial. When I felt that the operation was launched, I determined to leave it to the judgment of the profession. Since then, I have had very numerous communications from practically every part of the civilized world, and not a few from surgeons in the United States of America. Many of these have contained inquiries as to any changes I might have made in my technique. The object of the present paper is to answer some of these questions in the light of the experience of the last twenty-two years, and to do so without inflicting on the reader the statistics of the large mass of notes on which the conclusions are based.

I have continued to find trephining of equal service in chronic and in congestive cases, and even in the rare condition of acute glaucoma. The more I perform the operation the better I like it. It is a precise procedure, easy to carry out, and as safe and certain, I think far more so, than any other operation for glaucoma I know of. If, however, full advantage is to be taken of it, it is essential that certain details of technique and procedure should be carefully observed.

Preliminaries

It is a safeguard to get the patient to place a little perchloride of mercury ointment (1 in 3,000) in the conjunctival sac twice daily for a week before the operation, or if that is not possible, for as long as the time available allows. However, the risk of sepsis after a trephining operation is far less than that following the extraction of a cataract, for (1) the opening into the anterior chamber is very small, (2) the deep structures of the eye are not touched, and (3) the protecting flap is very large.

Once an operation for glaucoma is determined on, the sooner it is undertaken the better, as the mental stress to which the patient is subjected is thereby reduced to a minimum. Pilocarpin should be freely instilled during

this period of waiting, and regular sleep should be insured, drugs being given for that purpose if necessary.

The most perfect local anesthesia possible should be aimed at. Cocain drops (4 percent) with adrenalin solution (P.D. & Co. 1 in 1,000), are instilled three times beforehand, and followed by a free subconjunctival injection of novocain into both fornices. The facial nerve is paralyzed by an injection of the latter drug, combined with adrenalin, at the point where its trunk crosses the neck of the jaw. (O'Brien's method.) This eliminates squeezing of the eye, and so greatly adds to safety. A subcutaneous injection of trivalin-hyoscin half an hour before the operation helps materially to quiet the patient's mind and so to make the procedure easy. Very nervous patients are given fifteen grains of potassium bromide on first waking, and another dose of the same strength an hour before the operation, which is usually at 10:00 A.M.

The technique of the operation

This, indeed, has varied very little from the description I gave of it when I first brought it before the medical public, and which is fully outlined in my various textbooks, and in detail in "A Treatise on Glaucoma," published in 1922 (Oxford Medical Press.) There are, however, a few points which appear worthy of mention.

(1) Great care should be taken to avoid bringing the conjunctival incision down to the limbus, as doing so greatly limits the area available for filtration.

(2) In raising the conjunctival flap so as to expose the limbus it is vitally important to keep as close to the sclera as possible, and so to insure a maximum thickness throughout its whole area for the covering of the filtration hole in the sclerocornea. I lay special stress on this because, from time to time, the view is put forward that the flap should be thin. I hold this to be a mischievous error. *Safety after operation depends largely on the thickness of the protective covering.* Where the covering is thin, either designedly because the sur-

geon has deliberately made it so (and I have had such cases referred to me afterwards), or because, as sometimes happens in very old people, the subconjunctival tissue is very scanty, there is a great liability to the formation of a vesicular scar, a very decided disability (if not danger), the treatment of which will be discussed later.

(3) Nothing has occurred to shake my firm conviction that the cornea should be split, and not cut into with a sharp instrument. After using many devices I have gone back, for years past, to the use of the closed points of a pair of iris scissors. If this action is correctly carried out, the smooth area of the split cornea clearly demonstrates that the natural plane of cleavage has been followed.

(4) The Trephine. I am utterly opposed to mechanical trephines. The actual cutting of the sclerocornea is very rapid in skilled hands, and nothing can make up for the tactus eruditus behind such hands. I do not lay any stress upon the exact model used. Each surgeon has his own preferences. I have given elsewhere the reasons that led me to the shape, molding, etc., of my own trephine. I want nothing better, but have no quarrel with others who prefer something different. What is, in my opinion, important is (1), that it should be very sharp, and (2), that it should be 2 mm. in diameter. The trephine should always be tested on a drum before use, and if it does not cut through the kid cleanly, by its own weight, on a backward and forward rotation, it is better to discard it for a sharper one. With regard to the size, a 2 mm. trephine admits of the blade being placed half on the cornea and half on the sclera, if the former has been split for a full millimeter, which, in the immense majority of cases, is possible and even easy. It also allows room for the use of forceps in the wound if this proves absolutely necessary; but I desire to make it clear that I look on all manipulations through the trephine hole as dangerous and to be avoided if possible. I believe that *the hall-mark of a good trephining is a minimum of inter-*

ference with the uveal tissue. If, as I have long advised, the handle is tilted forward so as to make the blade cut a little more on the corneal than on the scleral edge, the anterior chamber is safely opened. The bulging bead of iris pushes up the little trap door, hinged on its scleral edge. The two (trephine disc and iris) can be seized in one grip of the iris forceps and cut off with a single snip of the scissors. There is no detail in the whole operation more important than this. It is also an advantage that thus there is no risk of the disc slipping back into the anterior chamber. So far from agreeing with those who deliberately include iris in their scar, I look upon such inclusion as a great and wholly unnecessary evil. The impaction of iris in the trephine hole is, I feel sure, more likely to lead to blocking up of the drainage channel than anything else. If the iris is cut in the way I have described, it is not pulled into the hole and it slips back again into the chamber, while the filtering channel remains iris-free. This I look upon as the great goal of the filtering operation. If, for any reason, iris should become impacted, it can often be got back by the use of the irrigator (and I never operate without having one available) or by using a spud, but the prognosis after operation is much better where all such interference has been reduced to a minimum. It will be seen that I have never diverged from my original plan of operation expressed in my first book on "Sclerocorneal Trephining" in 1913 in the following sentence. *"The motive is to reach, tap, and subconjunctivally drain the anterior chamber, with a minimum of injury to the structures of the eye ball."*

(5) I have never put any value on an iridectomy in glaucoma for its own sake. Its object is "simply to avoid the risk of iris tissue becoming impacted in the trephine aperture during convalescence." (A Treatise on Glaucoma, p. 548, Oxford Medical Press). It effects this purpose by providing a sluice-gate for the outward passage of the aqueous fluid unhindered by any obstruction. So long as the trephine hole remains iris-free it does not really matter whether

a piece of iris has been removed or not. From time to time, for one reason or another, the bead of iris slips back into the anterior chamber uncut. If it shows no tendency to bulge into the hole it is my practice to leave it undisturbed, and provided that no impaction takes place during convalescence, the result is just as good as if a peripheral iridectomy had been successfully performed. I must confess that I watch these cases always with a little anxiety, but I think that as a rule, the dangers involved in fishing for iris in the trephine hole are greater than those involved by the policy of letting well enough alone.

I have among my patients several who have had a broad iridectomy on the one side and a trephining with a small peripheral one on the other, and who bitterly complain of the dazzling from the large coloboma, which had been made before I first saw them. I feel as strongly as ever I did, that the removal of a piece of iris does not cure glaucoma; and that when a cure is obtained after this operation, it is due to filtration having been accidentally established along the path of the incision. In other words, it is due to a sclerotomy. While admitting that a sclerotomy is sometimes highly successful, I deprecate its being looked on as a routine operation for glaucoma as I consider that in any form its results are too uncertain to be reliable. It will be seen that I have consistently followed an ideal, namely, that of performing an operation calculated to insure the formation of a sufficient filtering scar with a minimum of surgical interference.

(6) Of the other steps in the operation I have little to say, for I have nothing to add to my past descriptions already referred to, but there is one detail of value for which I believe we are indebted to Mr. Foster Moore, namely, the use of a continuous suture in the closure of the wound. In applying this suture care should be taken to avoid, if possible, picking up the subconjunctival tissue, and to include only the conjunctiva. By this means we get a clean, neat scar. I think harm is some-

times done by tags of subconjunctival tissue being everted during the suturing and interfering with ideal first-intention healing. I keep my mounted suture in alcohol till the last moment, pick it up in a needleholder, dip hand, needle-holder, and suture into a 1/3000 solution of biniodide of mercury, and then start the suturing. The assistant holds a small mounted swab soaked in iodine under that part of the suture which is about to run through the wound, thus rendering it absolutely aseptic. Both ends of the suture are cut fairly short after the whole has been pulled by the two ends so as to make it firm.

The removal of the suture on the fifth day can be made absolutely painless if certain precautions are taken. Adrenalin and cocain are first instilled on two occasions at five-minute intervals. A loupe is used to ensure very accurate vision; the point of a blade of a sharp pair of iris scissors is inserted in several places under the loops of the stitches seen in the wound, and the sutures cut through. No forceps are used in doing this, and so all pull on the eye is avoided. This is a very important detail, for apart from the fact that pain may be inflicted by the pull itself, a nervous patient will sometimes move his eye as soon as he feels the pull, and so cause himself pain which may lead to sudden and disconcerting movements. The removal of the stitch in several pieces is easily affected by means of epilation forceps without the patient being aware of what is being done. A spatula passed under uncut loops of the suture is also often helpful in the painless removal of the stitch. Stress has been laid on these details because it is found that some patients dread this little procedure more than they do the original operation. With those who are very nervous I often find it pays to say nothing about what one is doing until the stitch is actually out.

Sequelæ of the operation

(1) Detachment of the choroid.

This has often been described and is familiar to surgeons. There is one interesting point in connection with it.

Keeping the patient lying down does not appear to have a beneficial effect, but rather the reverse. I have in the past, insisted on the patients keeping in bed with no good result, and then in despair, have given consent to their walking about and taking a usual part in the activities of life, only to find on the next examination that the visual shadow of which they complained, and the detachment which was responsible for it, have both most fortunately disappeared. I therefore, do not now keep these patients in bed.

(2) Intraocular hemorrhage.

Dr. H. W. Woodruff, who has taken an interest in the question of intraocular hemorrhage in operations on the globe, has kindly told me that he has "found a few cases in the literature of expulsive hemorrhage in trephining," but that he agrees with me as to the value of the small opening made by the trephine in reducing this danger to a minimum. I have operated on a very large proportion of late cases, which have been referred to me as a last hope. This is the very type of case in which expulsive hemorrhage would be expected, and yet I have never met with it, either in my own practice or in that of anyone else. It is not infrequent in such late cases to find the eye harden very markedly soon after pressure is relieved. The secondary hardening usually passes away in a day or two with the reestablishment of filtration. It has always seemed to me to be due to a serous exudation, the result of a sudden alteration in the pressure, and not to hemorrhage, for, were it due to the latter, it is difficult to believe that it would clear up so rapidly and so completely as it does. In any case, there has never been a question of an expulsive hemorrhage.

(3) The types of filtering scar.

One meets with two quite distinct types of scar, both of which seem equally efficient and equally satisfactory. In the first, the trephine hole can be clearly seen, not only shortly after the operation, but indefinitely for many years. It may possibly be that this kind

of scar yields in a very small number of cases in the passage of time, and so provides some of the cystoid cicatrices, but there can be no question that in the great majority of instances, it furnishes a safe, lasting, satisfactory, and excellent filtering pad, with no tendency to become unduly prominent or to give any form of trouble. In the second type, the scleral hole is soon lost to view, being hidden by a flat area of opaque, boggy tissue. I must confess that this is the type of scar I would aim at as my ideal. The thicker covering of the aperture in the sclera seems to make for greater safety. Unfortunately, I know of no way in which one or other kind of scar can be secured at will. Indeed, it may happen that in the same patient one type is obtained in one eye and the other in the other, despite the fact that, so far as can be seen, the steps of the operation and the anatomical peculiarities of the eye appear identical.

(4) Undue prominence of the scar.

I have seen this very infrequently, both in my own cases and in those of other surgeons, and have been consulted from very different parts of the globe as to the best treatment to employ. These projecting scars are due, I think, in skillfully conducted operations, to one of two causes. (1) The presence of a scanty subconjunctival tissue preventing the formation of a thick flap, and (2) the presence of adhesions hindering the free flow of fluid under the conjunctiva, and so restricting the filtering area to a limited space in the near neighborhood of the trephine hole. Both these points deserve further discussion. (1) The moral of the first point is, that the flap should always be as thick as possible. Some of the cystoid scars are certainly due to a failure to comply with this elementary requisition. A thin flap, consisting only of the conjunctiva, is extremely easy to raise. Likewise, it is very easy to fashion the flap when the subconjunctival tissue is scanty, and much less so when it is abundant and dense. All the same, I welcome the latter difficulty, knowing that it means a more satisfactory filtration area in the long run. (2) Ad-

hesions of this kind are only met with when there has been previous interference with the eye. Although in late cases there may be difficulty in approaching the limbus and in splitting the cornea owing to long-standing congestion of the parts, associated with the tendency to the formation of cicatrization, one does not usually find the spread of the filtering fluid interfered with in such cases. Where there have been previous operative procedures, even at the opposite side of the cornea, or where subconjunctival injections have been given, a limitation of the filtering area is to be feared. I think that the liability is greater after trephining below the cornea. The prominence of the filtering scar may be so great as to cause the patient distinct discomfort. He feels the eyelids riding over the projection, and this may get very much on his nerves; should he allow it to do so, and should he consequently devote much of his attention to this inconvenience, it may become an obsession. I have known one of these scars actually burst under sudden movements of the lid; indeed, on one occasion, I actually saw it happen whilst I was examining a very nervous patient who made a sudden and violent movement. A great deal can be done for these patients by painting the vesicle with a solution of silver nitrate. I usually start with 3 grains to the ounce and work up to 10 grains, using the paint at weekly intervals. If cocaine and adrenalin are instilled beforehand; if a skillful nurse mops up all superfluous secretion, both before and after the application of the silver; and if the eye is freely washed out immediately afterwards, there is practically no pain. If there is any, hot fomentations will greatly relieve it. The effect of the silver nitrate applications is twofold. (1) It causes a distinct thickening of the covering of the vesicle, and (2) it renders it much less hyperesthetic. I first learned the latter property of silver nitrate painting in Madras where it was very freely in use for granular ophthalmia cases. The diminution in the sensibility of the conjunctiva after a number of paintings was most marked. In the class of case we are now dis-

cussing, it has likewise proved very beneficial. It should however, in addition, be pointed out clearly to the patient that a little inconvenience in the presence of an over-prominent scar is a small price to pay for the retention of useful sight.

- (5) The spreading of the filtering scar down on to the cornea.

This is a very rare condition. The attachment between the conjunctiva and the cornea appears to be unusually loose in these cases, and the weight of the fluid suffices to detach the former very slowly from the latter. As a rule this encroachment of the scar on the cornea is quite unimportant and very limited in extent. I have, however, met with one exception to this rule. It was in an elderly man referred to me by a very distinguished American surgeon, and operated on by me in 1921. Nine and a half years later the surgeon reported that the bleb formation had spread down to the cornea "so far as to encroach on the upper border of the pupillary corneal area." He "cauterized the cystic scar in a curved area in the cornea just within the limbus so as to shut off the extension of filtration downward." The immediate result was excellent, and it looks as if the trouble has been overcome, as the portion of the scar over the sclera has filled up again and taken on its function of filtration instead of being flattened and useless as it was before the cauterization. A very instructive case.

- (6) The need of a second operation.

From time to time, though fortunately rarely, the trephine hole becomes blocked up, filtration ceases and the tension of the eye rises. In yet other cases, there is still some filtration, but not sufficient. A second operation is then called for. My own practice has been to trephine below. This is a little more difficult than the operation above the cornea, but yields excellent results. I think the patient is more liable to complain of the scar catching on the lid, and theoretically it is in a more exposed position, but so far, I have never seen any serious results follow, though of course it is to be admitted that the num-

ber of these cases is not very large and that the statistics are correspondingly of less value.

I think that only in very desperate cases should an attempt be made to trephine in the palpebral slit. Such a procedure entails several serious disadvantages. (1) It is very difficult to get close up to the cornea in the horizontal meridian. (2) The scar always lies exposed, being deprived of the protection of either lid. (3) The compressing action of the lids on a filtering scar in the palpebral aperture is, I think liable to lead to irritation and to predispose toward the formation of a cystoid cicatrix. (4) Possible not a very important point. It is more awkward to work to one or other side than either above or below.

- (7) Occlusion of the pupil following operation.

This is only likely to occur if the surgeon is caught off his guard. I have had not a few cases referred to me in which the good results of a skillful trephining have been forfeited by a neglect to maintain mydriasis during convalescence. I now regularly instil atropin drops (four grains to the ounce) into the eye immediately after operation, and am careful to keep the pupil dilated for three weeks afterwards, using just enough of the mydriatic for the purpose. Where local signs of atropin irritation occur, there is sometimes considerable difficulty in securing our end. Smearing the lids all round before instillation, with zinc ointment made with equal parts of zinc oxide, castor oil, and lanolin well mixed, is often helpful. Sometimes hyoscyamus ointment is well borne and effects our purpose. If even this gives rise to local irritation, homatropin will, as a rule, prove efficient and unobjectionable. Whatever mydriatic is used, its effect can be greatly increased by dropping into the eye a few minutes beforehand, cocain and adrenalin drops, the former 4 percent, the latter 1 in 1000. A repetition of the same drops three quarters of an hour later greatly intensifies the action of the mydriatic.

54 Welbeck street.

CATARACT AND OTHER OCULAR CHANGES IN VITAMIN G DEFICIENCY

An experimental study on albino rats

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Experiments recorded in this paper indicate that a diet deficient in vitamin G causes cataract in rats in from two to three months. From the Departments of Physiological Chemistry and Anatomy, School of Medicine, University of Arkansas, and the Department of Ophthalmology, School of Medicine, University of Iowa.

Cataracts, usually preceded by inflammatory changes in the lids and corneae, occur with regularity in young albino rats receiving a diet deficient in vitamin G. During the past two years such ocular changes were noted in practically every surviving animal receiving such a diet.

Goldberger, Wheeler, Lillie, and Rogers¹ in 1926 demonstrated that water-soluble vitamin B consists of at least two factors. The first factor is designated as vitamin B, B₁ or the antineuritic element. The second factor is called vitamin G, B₂ or the pellagra-preventive element. Vitamin G, with which we are concerned, is found principally in yeast, liver and other meats, milk, green leaves, roots and tubers. It is soluble in water and is comparatively thermostabile. Animals fed upon a diet deficient in vitamin G fail to grow, develop pellagra-like lesions of the skin and show changes in the digestive tract and eyes.

In 1926 Goldberger and Lillie² reported certain changes about the eyelids of rats receiving a diet deficient in vitamin G. There was some loss of hair about the lids and the latter were adherent, with dried secretions along the margins.

In 1927 Chick and Roscoe³ published a report of experimental studies on vitamin G deficiency in which it is stated that young rats showed an alopecia around the eyelids followed by conjunctivitis and ophthalmia. A later publication, in 1928, by the same au-

thors,⁴ reported alopecia and sticking together of the eyelids. It is stated that the eyes appeared sunken but healthy.

Salmon, Hays, and Guerrant,⁵ in 1928, reported having observed lacrimation, ptosis, alopecia of the lids, conjunctivitis and opaque eyeballs in some rats receiving a vitamin G deficient diet. They state that, in those rats with opaque eyeballs, the cornea was rarely involved and that the opacity centered in the vitreous humor but sometimes affected the crystalline lens. In all the available literature only this mere mention of lens opacities was found.

In 1928 Findlay⁶ reported having observed eye symptoms in some rats. There was an alopecia and swelling of the lids, accompanied by conjunctivitis. The corneae remained normal.

Sherman and Sandels,⁷ in 1929, reported sore eyes in rats receiving a diet deficient in vitamin G. They observed alopecia of the lids and an abnormal sticky palpebral secretion. In another article, in 1931, by the same authors,⁸ there is reported a "spectacle-like" appearance due to loss of hair, and a scabby condition of the skin around the eyes. Sections were made of the eyes and lids and Pappenheimer reported inflammation of the lids, a slight keratitis and an acute inflammation of the lacrimal glands.

In 1931 Thatcher, Sure and Walker⁹ reported an ophthalmia in 15 percent of young albino rats receiving a diet deficient in vitamin G.

Experimental

Young healthy albino rats (Wistar strain), aged approximately twenty-one days and weighing thirty-five to forty-five grams, from different litters and from stock unaffected with congenital cataracts, were placed on a vitamin G deficient diet. These animals had access to unlimited amounts of such food and distilled water. They were kept in a



Fig. 1 (Day, Langston, O'Brien). Young albino rat on vitamin G deficient diet. Acute stage showing alopecia of lids and cataract.

room at even temperature and housed in all-metal cages with raised screen floors.

The diet was the vitamin B-complex deficient diet of Sherman and Spohn,¹⁰ modified by incorporating an 80 percent alcoholic extract of rice polish. Such extract of rice polish supplied the antineuritic vitamin (*B* or *B*₁) but contained practically no antipellagric vitamin (*G* or *B*₂). Such a diet consisted of the following:

Casein (washed with 60% alcohol)	18%
Osborne and Mendel salt mixture	4%
Butter fat	8%
Cod liver oil	2%
Corn starch, on which had been evaporated the alcoholic extract of rice polish	68%

Each 100 grams contained the extract of 25 grams of rice polish.

A series of forty-eight animals was fed on the above diet, however eleven may be eliminated since ten died or were killed before lens changes were expected and one was placed on a normal diet early in the experiment. The following ocular signs were noted in the remaining thirty-seven rats (Table 1).

Control animals from the same litters which were fed upon a similar diet, with the addition of autoclaved yeast to provide vitamin G, grew normally

Table 1

Ocular changes in young albino rats receiving a diet deficient in vitamin G.

Symptoms	Number of animals observed*	Number of animals affected	Percentage of animals affected	Minimum time of appearance (in days)	Maximum time of appearance (in days)	Average time of appearance (in days)
Alopecia of eyelids	28	19	68%	45	80	63
Lacrimation	20	12	60%	45	75	56
Conjunctivitis	25	24	96%	48	84	66
Discharge	26	24	92%	49	84	69
Sealed lids	23	16	70%	49	84	68
Thick, swollen inflamed lids	27	25	92%	66	87	74
Anterior interstitial keratitis	8	8	100%	82	84	82
Cataracts**	37	35***	94%***	60	87	80

* As may be noted, all animals were not observed for each symptom.

** Cataracts were invariably bilateral except in one rat which was placed on vitamin G after cataract appeared in one eye.

*** Two rats were killed on the eighty-third day for study of the eyes. Cataracts were not yet present and might not have formed since these rats ate their cage mates and thus received some vitamin G.

and showed no ocular or other pathology.

Three animals were kept in complete isolation while on the G deficient diet. They developed exactly the same pathology as the other rats which were on a similar diet.

During the progress of these experiments other rats from the same strain were placed on a vitamin A deficient diet. No cataracts developed although the general condition of these rats was as bad or worse than that of the rats on a vitamin G deficient diet.

During the acute stage of lid, conjunctival and corneal inflammation a mucopurulent discharge was present in the conjunctival sac. In two rats cultures were made from the discharge and three organisms were isolated by J. G. Wahlin, bacteriologist at the University of Arkansas. The three organisms were staphylococcus aureus, bacillus bronchisepticus, and a few diphtheroids. It is probable that these organisms, which normally inhabit the skin and mucous membranes, gained a foothold and grew as a result of the low resistance produced by the vitamin G deficiency. It is difficult to believe they had any part in the formation of lens opacities since there was no purulent inflammation in the aqueous, uveal tract, or vitreous. An unsuccessful attempt was made to inoculate the conjunctiva of normal animals with this discharge.

After the formation of cataracts, six animals were fed autoclaved yeast in order to provide vitamin G. These rats recovered from all general disturbances quickly and grew rapidly but the blindness persisted. Upon examination the eyelids and conjunctivae appeared normal but the vascularized corneal nebulae and cataracts remained as evidences of the former dietary disturbance. The microscopic appearance of these eyes is described in the following section under the heading "Later stages."

Histopathology

The lids and eyeballs were removed for study from a large number of animals. Some were removed in the stage

of acute inflammation and others in later stages. All specimens were fixed in Zenker's or Bouin's solution, sectioned, and stained with hemotoxylin and eosin.

Stage of acute inflammation

Lids: Gross inspection often revealed almost hairless swollen lids, with the skin surface more or less covered by moist and dry mucopurulent exudates. Microscopic examination showed moderate infiltration of the skin and subcutaneous tissues with lymphocytes and polymorphonuclear leucocytes. Hemorrhagic areas were noted in many lids.

Eyeball: Grossly the cornea appeared clear in some eyes and slightly clouded in others. Superficial corneal vascularization was present in most cases. In a few eyes the oncoming cataract appeared during this stage as a white reflex behind the pupil. Some of the cataractous lenses were of normal size while others were enormously swollen.

Microscopic examination of the cornea revealed an inflammatory process in the anterior stroma. The epithelium was normal but small lymphocytic and leucocytic infiltrates, accompanied by new blood vessel formation, were found directly under the epithelium. The ap-



Fig. 2 (Day, Langston, O'Brien). Normal eye in the one rat which received vitamin G immediately after unilateral cataract developed.

pearance was similar to that of an interstitial keratitis of the anterior stroma layers. In only one eye was there any evidence of iris pathology: a thin layer of fibrin was present on the anterior iris surface. The vessels of the ciliary body were slightly congested and occasionally there was a questionable increase in mononuclear cellular elements. The crystalline lenses were normal in some cases but in others, cataracts, in various stages of maturity, were present. The earliest changes appeared as proliferation of the lense epithelium and as a breaking down of the fibers directly under the capsule. Some lenses showed complete dissolution of the lens fibers with the formation of morgagnian globules and conversion of the lens into an amorphous mass. All the other ocular structures were normal.

Later stages

Lids: Aside from alopecia, the lids appeared normal to gross inspection. Microscopically the lids were normal.



Fig. 3 (Day, Langston, O'Brien). Cataractous eye of the same rat as shown in Fig. 2.

Eyeball: Faint opacities and new blood vessels were seen in the cornea when observed with a loupe. A white reflex was present behind the pupil. Microscopic examination revealed small areas of scar tissue, with new blood vessel formation, in the anterior corneal stroma. The crystalline lens was cataractous. There was some proliferation of the epithelium, the lens fibers were degenerated, and the lens was converted into an amorphous mass. Morgagnian globules were present throughout. Otherwise the eyeball was normal.

Comment

Most of the investigative work on the vitamin B-complex (vitamins B, G and possibly others) has been carried out by biological chemists and those interested in general pathology, hence the intra-ocular changes may have been overlooked. To one familiar with the use of the loupe and ophthalmoscope the corneal and lenticular changes are easily recognized.

Conclusions

In a series of forty-eight young albino rats, receiving a diet deficient in vitamin G, bilateral cataracts developed between the sixtieth and eighty-seventh days in all but three of the thirty-seven rats which survived. One of the three developed unilateral cataract and was placed on vitamin G immediately, after which there were no further lens changes; the other two rats were killed before the maximum time of expectancy for the appearance of lens changes.

It appears that the absence of vitamin G was the sole cause of the cataracts and other ocular changes, since the further progress of such changes was stopped immediately by the feeding of autoclaved yeast with its high vitamin G content.

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SPONTANEOUS EXTRUSION OF INTRA-OCULAR FOREIGN BODIES

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Two cases are reported in which fragments of copper wire had penetrated the eyeball and remained in it for long periods, after which they migrated forward and came through iris and corneal limbus to be removed from subconjunctival space. A study of the literature reveals that neither the shape nor the material of the foreign body is the determining factor in such migrations. The movement is forward in all cases. Read by title before the American Ophthalmological Society, June 9, 1931.

It has long been known that foreign bodies within the globe sometimes change their position, even migrating a considerable distance from the point where they are first observed. At times the migration extends until the foreign body reaches the outer coats of the eye and is then spontaneously expelled. Two cases of spontaneous extrusion have been observed by the writer, which seem of sufficient interest to be added to those already on record. A consideration of this phenomenon, and the factors concerned therein, as revealed by other reported cases, may be of general interest.

The first recorded instance of spontaneous extrusion of an intra-ocular foreign body is that of Castelnau in 1842. From that time until the present not more than a hundred cases have been reported. In view of the great number of individuals who suffer penetration of the globe and retention of a foreign body, the percentage of those which work to the surface must be exceedingly small. An examination of

text-books and treatises on ocular injuries finds it rarely mentioned.

Numerous questions come to mind as to what causes a foreign body in the globe to change its position and even to work its way to the surface. Is it because of the form of the foreign body, sharp and needle-like? Is it only metallic substances which so act, as the result of chemical action of the foreign body on the tissues? Does it follow the path which it traversed as it penetrated the globe? Does the foreign body move backward or only forward? Most of these questions can be more or less satisfactorily answered by a review of the literature of published cases.

That the shape of the foreign body is not the principal factor in migration is proved by the fact that not only splinters and pieces of wire undergo change of position but also spherical bodies, as in the case of a lead shot which worked forward from near the macula to the anterior chamber, reported by Kauders. He says: "This is one of the rarely observed cases of

wandering of a foreign body in the globe. It is unthinkable that the foreign body was in the anterior chamber for twenty-five years. Also, the ophthalmoscope shows evidence of its wandering. It is especially interesting that the foreign body was retained for twenty-five years without irritation and that its path can be definitely followed through the eye. The foreign body landed on the retina above and temporal to the nerve; it then got into the post-choroidal space and traveled forward to the anterior chamber. It produced a yellow streak in the retina and choroid during the course. It may have been propelled through pressure or through the reactive inflammation in the tissues as it was moved along. The foreign body was thus brought to the ora serrata, lifting it gradually to the ligamentum pectinatum, which it perforated, and then came into the anterior chamber. Only then did reactive inflammation appear to cause the patient to seek treatment." Kipp, in 1884, reported the expulsion of a piece of copper, 4 by 3 mm., which had been retained for four years. These two cases and others like them prove that the shape of the foreign body is not the reason for its expulsion and refutes Denig's statement that "The foreign body must not be too large, must be without sharp angles and must be surrounded by leucocytes".

That spontaneous extrusion is not limited to a particular metallic substance is shown by the fact that not only copper (the most frequent) is so expelled, but iron (Hilderscheimer, Gesang), lead (Wickerkiewicz), stone (Jaeferson), brass (Denig, Blake), have also been cast off. However, copper has been more often recorded as the offending substance and is the least well tolerated.

Just what rôle is played by the chemical action of the foreign body upon the ocular tissues is less easily determined. Kostenitsch states that if a foreign body is surrounded by fibrin it becomes fixed in place. The more severe the reactive inflammation the greater is the proliferation of the pre-existing con-

nective tissue, and encapsulation results. Some substances suffer incrustation with inorganic surface covering and become insoluble. In this way certain of the foreign bodies, though not chemically indifferent, may be retained for long periods and not excite reaction in the tissues.

In many instances the foreign body which is spontaneously extruded emerges from the eye at or close to the point of penetration. The explanation which is most generally offered is that a fibrous band extends from the point of entrance to the foreign body and that when contraction of this band occurs later it pulls the foreign body towards the entrance wound. There are, however, frequent enough exceptions to this rule to indicate that this is not the only explanation. Late suppuration of the wound of entrance, with consequent weakening of the walls of the globe at this point has been noted several times and offers a reasonable explanation in these cases.

A fairly careful search of the literature does not reveal a single instance of the migration of a foreign body from before backward. Always the movement is from the point where the foreign body settled towards the anterior surface. Whether this results from compression of the globe by the extra-ocular muscles, or the pull on the choroid by the ciliary muscle in accommodation, or through the action of currents in the intra-ocular fluids, or is the result of contraction of fibrous threads to the foreign body, is not clear. No one alone seems a sufficiently satisfactory explanation. Outside the globe the foreign body may move backward, as in Hanke's case of double perforation of the globe by a splinter of iron, where x-rays taken at intervals showed a movement of the foreign body 5.5 mm. posteriorly in the orbit and 7 mm. to the nasal side of its first site.

The duration of the period of retention of the foreign body before being spontaneously expelled has varied from a few days to several years. In Jaeferson's case a piece of stone was expelled on the fourth day after the accident,

while in Kauder's patient a small lead shot was removed from the anterior chamber twenty-five years after it had penetrated to the retina. The latter case was not, of course, one of spontaneous extrusion.

The tolerance of the tissues varies greatly towards different foreign bodies, especially metallic ones. Leber considered copper to be the least well tolerated of all metals and Van Lint and others agree to this. The former says: "In so far as we know at present, metallic copper is the commonest substance which produces suppuration in the eye". Iron and steel as is well known, usually cause irritation and frequently lead to siderosis and may incite sympathetic trouble. On the other hand Reitsch reports the presence of a sliver of iron in the anterior chamber for twenty-seven years, and Ollendorf a splinter in the iris for thirty years. Leber considered lead to be the least irritating of metals, and Boehm concluded from experiments that the tissues resent its presence less than any other metal. Rollet and Aurand, also upon experimental ground, found the tissues exceedingly tolerant to aluminum. Stone, if sterile, is frequently well borne by the tissues, as in a case of Dickey's where a fragment was present in the iris for fifty-four years. Lowenstein advises conservative treatment of fragments of stone since they are well borne. Glass is a substance which causes little reaction in the tissue and may be carried about for long periods in the globe. In spite of the frequency of accidents in which glass enters the eye, I have not found the report of a single instance of its spontaneous extrusion, except where it was imbedded in the cornea. Certain extraneous circumstances have been considered by different authors as the immediate cause of spontaneous extrusion of the offending body. Thus, in one of Halasz's two cases, an eye containing a foreign body received a blow, with subsequent inflammation, followed by spontaneous expulsion. Gesang records a similar experience, the foreign body having probably been in the lens until the blow to

the eye. In numerous instances the foreign body has appeared at the site of an incision previously made in an attempt to remove the foreign body. Hilderscheimer considered that mercurial treatment of an iritis in an eye containing a splinter of iron may have produced a chemical change which resulted in the foreign body being expelled.

As to the actual intra-ocular changes which lead to the spontaneous ejection of a foreign body, we have several theories, some experimental proof and less histological evidence. The most outstanding are the experiments of Leber, who introduced numerous foreign substances within the globe and carefully studied the effects at various periods. He found that all metals call forth an inflammation in the eye which conforms approximately to the solubility of the foreign body in the eye fluids. The action of lead in the vitreous is little different from that of iron, but produces more marked changes than copper, provided the latter does not come in contact with blood vessels. In the anterior chamber lead soon acquires a coating of oxide and produces little tissue change. Lead produces no change comparable to siderosis or chalkosis (copper). The oxidation of iron and steel is well understood and its distribution and siderotic changes need not be dwelt upon. The effect of copper depends upon the tissues with which it comes in contact. Thus, if a piece of copper rests upon the iris or ciliary body, suppuration occurs, while a similar fragment may produce no change in the lens, where it may not cause even complete opacification. It is also well tolerated in the vitreous for long periods. The reason for this difference in action is that in the lens the copper is soon covered by an envelope of albumin, which prevents it from exercising its chemical action, while in vascular tissue it is partially dissolved and produces considerable inflammatory reaction.

Leber explained the loosening of the foreign body due to a chemical action. He lists three factors of spont-

taneous extrusion, namely, connective tissue proliferation, intra-ocular pressure, and the production of a leucocytic ferment, producing inflammatory weakening of the coats of the eye. He supposes a connective tissue strand to extend from the point of penetration of the globe to the foreign body, so that, after a period of "wandering" of the foreign body it is expelled through the changed tissues near the point of entry. If an inflammatory stage arises the expulsion is facilitated. The leucocytic ferment softens the tissues of the scar and increased pressure aids its expulsion. Wickerkiewicz confirmed the presence of the connective tissue strand in one of his histologically studied cases. Gesang made a similar observation.

Leber was unable to find any single substance which, when introduced into the anterior chamber, proved itself to be absolutely inert, not even excepting those substances which are considered by chemists to be completely insoluble. All substances so introduced attract leucocytes to themselves.

Case reports

Case 1. Male, aged 35 years, seen first on December 8, 1917, complaining of inflammation of the right eye of 3 months' duration. Patient stated that there had been a piece of brass wire in the eye for 5 years. Examination showed moderate circumcorneal congestion, a small round opacity of the cornea near the limbus at three o'clock, and beneath and slightly below this a hole in the iris. The lens was opaque, slightly subluxated, the anterior chamber deep and the iris greenish and tremulous. There was a small hypopyon and vision was reduced to light perception. The patient said that x-ray plates had been taken in New York, Seattle, and New Haven and a foreign body demonstrated. Under treatment the inflammation gradually subsided. On January 12, 1918, I made a note as follows: "I am beginning to think that the mass in the anterior chamber is wire". On January 12, 1918, a report from the X-ray Department of the New York

Eye and Ear Infirmary said that a small foreign body about 1 mm. long was present 5 mm. behind the cornea. My record of March 1, 1918, said: "Pain over right eye, tension, plus 2; bulging area at lower, nasal part of limbus. Seems as if f.b. might be coming through". Three days later the black spot at the limbus was larger. The conjunctiva was nicked with scissors and a piece of very fine brass wire $3\frac{1}{2}$ mm. long was extracted with forceps. The eye gradually became quiet again but later was operated upon for glaucoma in New York and enucleated.

Case 2. Girl, aged 17 years, employee of the American Brass Company, was injured on March 6, 1929, by the fine copper wire on a spool flying loose and striking the left eye. When first seen by me ten days after the accident there was a linear scar 4 mm. long running obliquely across the left cornea. There was moderate congestion of the globe and slight haziness of the lens. Atropine and silvol were ordered. On March 25, hypopyon had developed and on the thirtieth an x-ray was taken. A foreign body $5 \times 2 \times 2$ mm. was localized 4 mm. below the horizontal plane, 5 mm. to the temporal side of the vertical plane and 10 mm. behind the center of the cornea. The patient was hospitalized for two weeks and the eye became quiet. On April 26 there was a small protuberance of the iris at about six o'clock which looked as if the wire was pushing the iris forward at this point. An incision was made with a keratome and an attempt made to grasp the foreign body, if such it was. This was unsuccessful as the iris was caught in the forceps at each trial. The patient was discharged from the hospital a week later. On June 7 the girl was brought into my office and the wire was seen lying under the conjunctiva at the six o'clock position, near the limbus. It was grasped with forceps and easily removed. The cataract continued to develop and on May 15, 1930, was extracted after a section downward. The final vision was 20/50 plus on September 19, 1930.

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THE USE OF FASCIA LATA IN AN EXTENSIVE KERATOCELE

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A keratocele 6 mm. in diameter, associated with acute secondary glaucoma, was treated by the use of a fascia lata graft. There was immediate relief of pain and prompt cicatrization. The tension became normal and remained so. One year later the vision was 20/70. Read before the New England Ophthalmological Society, April 21, 1931.

J. H. R., forty years old, was first seen on March 24, 1930. He stated that while fighting a forest fire on March 18, 1930, a piece of hot charcoal flew into his left eye causing extreme pain, photophobia and lachrymation. He was advised by a general practitioner to use an eye stone which he kept in place for about twenty-four hours. When I examined him the left cornea showed an almost central circular area 6 mm. in diameter, dark gray in color, which bulged perceptibly above the level of the surrounding corneal tissue. The edges were clearly defined. The anterior chamber was deep and the tension, taken by fingers, high, perhaps equal to 85, (McLean). There was ciliary injection and considerable hypopyon and some hyphema. No drug appeared to control the pain. Before a paracentesis could be done the eye showed subnormal tension and from the history and appearance it was evident that there had been a rupture of the cornea. A pressure bandage was applied and the patient was hospitalized. For the next week he was carefully watched during what appeared to be a sloughing away of the corneal tissues over the burned area. At the completion of this process there was a large hernia of Descemet's membrane.

The lesion was not a staphyloma, which strictly speaking contains iris tissue; nor a keratectasia, which is produced by a non-perforating keratitis; nor a keratectasia ex ulcere, but a keratocele, the prognosis of which, as given by leading authorities, is distinctly unfavorable.

The optic keratoplasty of Muhlauer or von Hippel was not feasible. There was no precedent on which to act. In fact the statement is made by

Duane and others that "Treatment is powerless against a fully developed keratectasia". Abscission and exenteration is the treatment advised. Epithelium, Bowman's membrane, anterior and posterior lamellae of stroma, were gone, down to Descemet's membrane, over a central circular area of 6 mm. in a total of $11\frac{1}{2}$ mm. of the whole cornea.

On April 3, 1930, under local anesthesia, a button of fascia lata the size of the keratocele was laid in the defect, then a strip of fascia lata 9 mm. by 22 mm. was strapped across the eye (long axis horizontal). This was accomplished by weaving a single silk suture through each end of the strip and then taking a deep stitch into the tendons of the opposing recti and drawing the sutures taut and tying them. The upper lid was fixed by a single silk suture fastened to the cheek by adhesive. The fascia lata was taken from the thigh of the patient from between the posterior border of the tensor fascia femoris muscle and the great trochanter, by Dr. Charles Sziklas, while the eye was being prepared. The eye was inspected daily for a week. There was remarkably little reaction. The button was then removed and the strap tightened and left for another week. Following the operation the pain was relieved, concurrently with a return of the tension to normal.

What was the reason for the relief of the pain and glaucoma? Embryology teaches us that the cornea consists of three superimposed layers: 1. Conjunctival cornea; including anterior epithelium, Bowman's membrane, and anterior lamellae of the corneal stroma. 2. Scleral cornea; including, middle lamellae of corneal stroma. 3. Uveal

cornea; including, posterior lamellae of corneal stroma, Descemet's membrane, and endothelium. They become fused together, although continuity of origin finds expression in pathological conditions.

Was the glaucoma caused by an irritation of the nerve endings in the cornea? Undoubtedly the glaucoma was of the so-called vasomotor type, caused by the inhibition of the vasoconstricting mechanism, or by a paresis of the sympathetic nerve causing a stasis of the intra-ocular blood vessels.

At the end of two weeks the strip of fascia lata was removed as it was apparent the hernia of Descemet's membrane was reduced, and that the corneal tissue had regenerated.

One year from date of operation

there was no bulging to be seen, only a leucoma of about 3 mm. in diameter. The eye was white and quiet, with vision 20/70. No references on this subject could be found in American literature, but Otto Reimer and Goldfeder have reported several successful cases from abroad.

Conclusions: (1) An extensive keratocoele can be repaired. (2) A vasomotor type of glaucoma can be relieved by mechanical means alone. (3) Auto-genous fascia lata is well tolerated in the eye for at least two weeks. (4) Fascia lata should be considered in all repair work on cornea and sclera that is too extensive for conjunctival flaps; also in lagophthalmus and Christian's syndrome.

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EPINEPHRIN IN PROGRESSIVE MYOPIA

2. Phase of Ocular Tension

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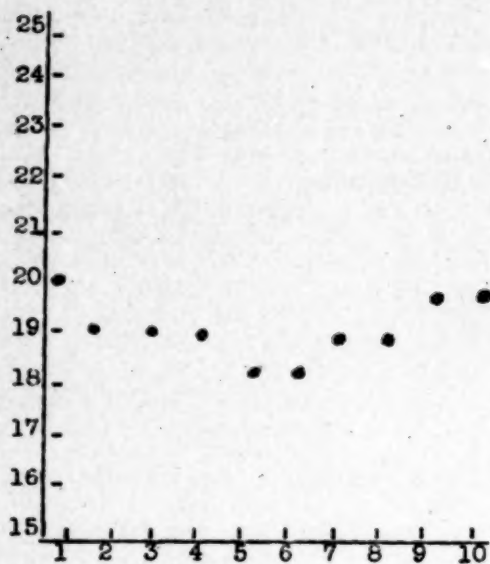
The effect of epinephrin solutions of varying concentrations on the tension of the eyes of ten normal individuals was determined by tonometric measurements at short intervals after instillation of 3 minims into the conjunctival sacs. All dilutions produced a fall in tension of 2 to 3 millimeters of mercury during second to fifth minute with a return to previous level by the tenth minute. From the Ophthalmological service of the Mandel Clinic and the Michael Reese Hospital.

In the initial paper¹ of this series the effect on general blood pressure and pulse rate caused by instillation of various concentrations of epinephrin into the conjunctival sac was considered. Laboratory and clinical evidence warranted the conclusion that even in high concentration (1:100) no general response was evoked. A study of variations in the ocular tension of these same individuals was recognized as being of importance. The purpose of this paper is to show changes in the ocular tension, in normal eyes, when various dilutions of epinephrin were instilled. The use of epinephrin alone and also in chemical combination in glaucoma is a fairly well-known story.

References in the literature reveal the fact that epinephrin was used for the

most part subconjunctivally as injections in 1-1000 solution. The early research was done by Wessely², Schultz³, and Meltzer and Auer⁴ on normal eyes. Erdmann⁵ revived the use in glaucoma, and finally Hamburger⁶ emphasized its use. Following Hamburger, many used the subconjunctival injections in glaucoma and gave reports. Janesch⁷, Kollner⁸, Rentz⁹, Safar¹⁰, Mans¹¹, Romer and Krebs¹², Samojloff¹³, Heimann¹⁴, Kayser¹⁵, Kalfa¹⁶, Domiequez¹⁷, and Ungerer¹⁸, added to this phase. Wessely¹⁹, in 1905, said in order to get lowering of tension subconjunctival injections were necessary. In 1921 Arnold Knapp²⁰ reported a short series of cases in which 1-1000 solution was instilled. There was no change of tension in 12 cases and only 3 were reduced in tension.

Epinephrin 1-1000

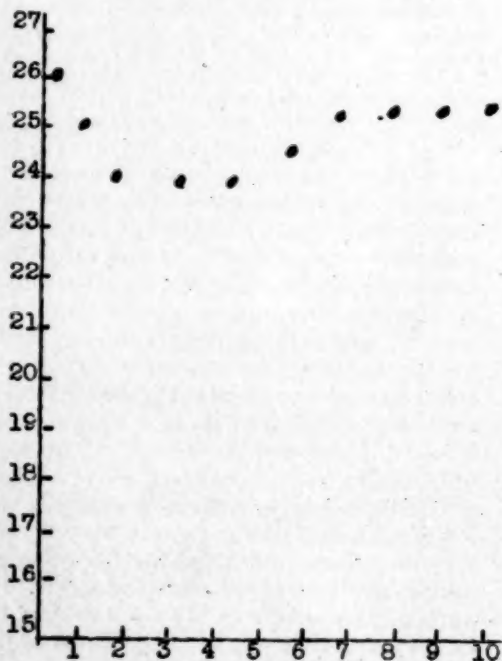


Time in minutes on base line.

Tension in mm. Hg. on
vertical line.

Curve No. 1.

Epinephrin 1-250

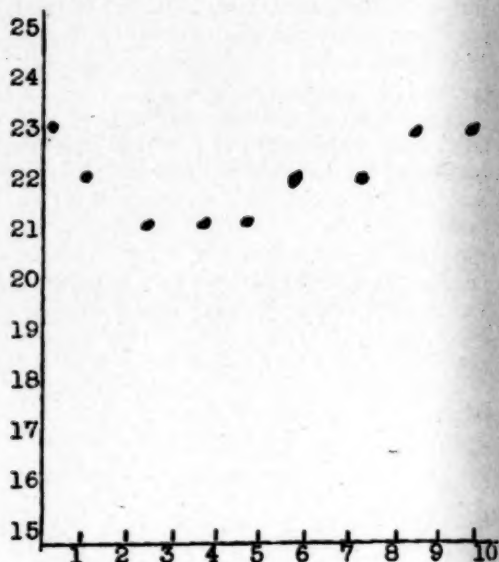


Time in minutes on base line.

Tension in mm. Hg. on
vertical line.

Curve No. 3.

Epinephrin 1-500

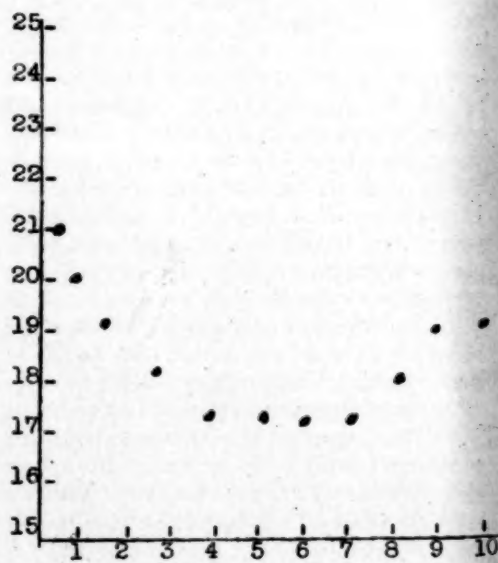


Time in minutes on base line.

Tension in mm. Hg. on
vertical line.

Curve No. 2.

Epinephrin 1-100



Time in minutes on base line.

Tension in mm. Hg. on
vertical line.

Curve No. 4.

Gradle²¹ found that cotton pledgets underneath the upper lid lowered the tension of a normal eye in 12 minutes. Thiel²² used an epinephrin bitartrate ointment with very satisfactory results. Hamburger²³ then proposed glaucosan in its various combinations with well-known pharmacological reactions. Since this paper has been in preparation an article by Green²⁴ calls attention to the attempt to prepare a drug comparable to glaucosan for consumption in the United States. As far as I have been able to determine no report has been made concerning ocular tension with concentrated epinephrin.

In this study two percent butyn was instilled in both conjunctival sacs for anesthesia. Tension was measured with the latest model Schiötz tonometer using only the 10 gram weight. The use of a single weight was done purposely as it was felt that repeated manipulation, by lowering tension, might mask the results. A record of only one dilution of epinephrin was made on a single day, and the measurements of other dilutions were made as nearly as possible at the same time of day. Normal tension was determined at each sitting. Tension is

recorded in millimeters of mercury for the various dilutions. No attempt has been made to correlate pupillary changes as this has been relegated to a later communication.

Epinephrin in dilutions of 1-1000, 1-500, 1-250 and 1-100 was used on ten individuals. Three minims of the solution were instilled in each conjunctival sac and tonometer readings taken at intervals up to 10 minutes. Findings were recorded but are not published in toto as similar reactions were obtained in all cases. Typical curves of tonometric readings with the four dilutions, are shown.

Conclusions

1. Epinephrin causes a lowering of intraocular tension in the majority of cases.

2. A direct relationship exists between the decrease in tension and the concentration of epinephrin.

3. The decrease in tension begins immediately and reaches its maximum in from 5 to 6 minutes.

4. The patients had no discomfort from these procedures.

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THE EFFECT OF RELATION TO BACKGROUND ON THE SIZE AND SHAPE OF THE FORM FIELD FOR STIMULI OF DIFFERENT SIZES

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A further study of the factors that affect the size and shape of the form field is here reported. In this case two variables only were permitted, namely, size of stimulus and relation of stimulus to background in regard to brightness. It is shown that variation in brightness difference affects the size of the field more with small stimuli than with large. Some of the causes of error due to improper methods in taking fields are discussed. From the Research Laboratory of Physiological Optics, Wilmer Ophthalmological Institute, Johns Hopkins Medical School.

Introduction

Several incentives have led to this study. Among these the following may be mentioned.

(1) We need to know the factors which affect the size and shape of field and the approximate amounts of these effects for the form field as well as for the color fields. In the study of factors thus far, there has been an undue concentration on the color fields.

(2) We have shown that great sensitivity can be added to scotometry with the form field stimulus by using stimuli of low visibility. The visibility of the stimuli may be decreased by decreasing their size, their brightness difference from the background, the intensity of the illumination, and by a combination of any two or all of these means. However in the selection of stimuli for the search for scotomas, we need to know the size of field for which the examination can be made with the various stimuli. The present study gives a fairly accurate idea of the size of field that may be expected with different sizes of stimulus for different relations of stimulus to background under 7 foot-candles of illumination.

(3) A corresponding increase of sensitivity may also be expected in the use of stimuli of low visibility in perimetry for the detection of the nasal step and other irregular cuts and indentations in the field. However, stimuli of low visibility are not suitable for use in cases where only the nerve fibers which reach the far periphery of the retina are affected. For this and other reasons to be given later in the paper, we again need

to know what regions of the field can be examined with stimuli of various degrees of visibility.

(4) Two reasons may be cited in explanation of the great sensitivity of colored stimuli for the detection of pathological disturbances: (a) their low visibility as compared with white on black or black on white for equal sizes and equal intensities of illumination, particularly for the paracentral and peripheral portions of the field; and (b) the possibility of a greater effect of pathological conditions on the color than on the form sense. A great deal of help can be had in the evaluation of these two possibilities of explanation by the use of form and color stimuli of equal visibility for the zones or regions of the field under examination. Form and color stimuli which give coincident limits have approximately equal visibility for the part of the retina in question. Data obtained in this study give the limits for form stimuli of varying degrees of visibility. These data will be of service in the selection of form stimuli for a comparison with colored stimuli.

(5) We have learned that in the use of the Ferree-Rand perimeter, some examiners, overlooking the effect of relation to background on the visibility of the stimulus, are accustomed to determine the limits of the field with the white stimulus on the gray arc of the perimeter as background. In view of this practice it may be helpful to show the effect of relation to background on the size and shape of the form field for stimuli of different sizes. In thinking of

visibility, we should remember that objects are seen because of their size and their apparent or sensation difference from the background. For colorless objects two important factors in the apparent or sensation difference from the background are difference in coefficient of reflection and intensity of illumination. With a given difference in coefficient of reflection, the sensation difference increases rapidly with increase of intensity of illumination. Some examiners are, it seems, inclined to use a white stimulus as if its visibility were independent of the background against which it is viewed, and of the intensity of illumination. Such practices in perimetry can not help but lead to inconsistent and confusing results.

In this connection it may be said that the stimuli used by these examiners, namely the small pigment discs mounted at the end of slender rods, were intended for use only with the tangent screen of the perimeter. With these stimuli it would be practically impossible to follow with precision on the arc of the perimeter, the meridian that is being examined. Also the motion is apt to be irregular and jerky and the moving rod and hand of the examiner unduly distracting to fixation, particularly for untrained observers such as are found in the dispensary and the clinic. Indeed, an accurate control of fixation cannot be expected with a moving stimulus, even when the movement is made under the best possible conditions. Further, when the rate of movement is slow, the eye is fatigued unduly, and when it is fast, the stimulus has gone far beyond the true location of the limit before the patient can signal, and the examiner act on the signal that the point of disappearance of the stimulus has been reached. The rate of movement, too, must necessarily vary greatly with different examiners and with the same examiner at different times and at different points in the field. In fact, without automatic timing, it is impossible to standardize rate of movement and its effect on the location of the limit.

It is permissible to use a moving

stimulus only until the limit is located roughly, then if a reasonably satisfactory reproducibility of results is wanted, even with form stimuli, the final determination must be made by the preexposure method. For this, the test surface is covered with a card of the brightness of the stimulus until the fixation is taken. At a prearranged signal such as "Now" given by the examiner, the stimulus is exposed for approximately one second and re-covered. The stimulus is then moved and the procedure is repeated until the exact limit of sensitivity is found. All the time the examiner should have the eye of the patient under observation to see that noticeable movement has not taken place. With a moving stimulus this can not be done satisfactorily because the examiner's attention has to be given to the control of the rate and direction of movement of the test object. On the other hand, in the use of the preexposure method, the natural procedure is to watch the eye of the patient while the exposure is being given.

In the training of numerous people in the work of perimetry, opportunity is had of observing the errors that are apt to be made with different methods. One example of failure to watch the eye of the patient may be of interest here. The field of a patient, who had remaining in the right eye only an oval patch of sensitivity to the temporal side of the fixation point, was being mapped by moving the stimulus mounted on one of the rods noted above along the arc of the perimeter. Apparently unnoticed by the examiner, the patient moved his eye nasalward in order to see the fixation object. In any event, the field as mapped showed a small oval area of sensitivity fairly symmetrically positioned about the center of the field. The error was due in part to carelessness on the part of the examiner but in very large part to the method of working. As already stated, it is very difficult to give the attention needed to moving the stimulus along the arc of the perimeter and at the same time to be properly observant of what the pa-

tient is doing. In several instances where this method was used, the fields have been mapped as approximately normal in shape in cases in which there were definite hemianopias or large cuts over a considerable part of half of the field. In these cases apparently the patient followed the stimulus with his eye sufficiently widely to fill out the blind half of the field. Unfortunately too, just the people who are the least fitted by training and experience in perimetry to use this method are the ones most inclined to use it. Moreover, it is used most frequently on the type of person with whom any but the most careful methods of control are unsafe, namely the dispensary and clinic patient. The matter is of more than usual concern to us because the method, while practiced to some extent before, seems to have come into a wider use with the introduction of the Ferree-Rand perimeter with its gray arc and with the stimulus rods convenient for use on this arc.

Another modification of the moving stimulus method as used by some examiners is a rather wide "jiggling" or vibratory movement of the test object, compounded with the lateral movement near the anticipated location of the limit. The reason given is that a moving object can be seen more readily than a stationary object in the peripheral field. There seems here to be some confusion of thinking as to the purpose of the examination. It is not the purpose of the medical examination to push the limit as far as possible from the center of the field. A very important object, however is to secure the highest possible reproducibility of result for the sake of comparison from time to time with the same patient and with different patients. How it could be hoped that the range and other aspects of the vibratory movement could be made uniform from time to time and at different points in the field for the same examiner and for different examiners, and how it could be expected that the limit could be located with satisfactory precision and reproducibility by this method, is difficult to understand. Moreover the practice, particularly in

the hands of an unskilled or careless examiner, is often very confusing to the patient.

Surprising as it may seem, no small part of the inducement to use the pre-exposure method in medical perimetry is the time it saves with dispensary and clinic patients. That is, by the use of this simple methodological procedure, satisfactory results can be obtained more quickly and with much less fatigue and confusion both to patient and examiner than by any other method that we have as yet employed. This is particularly true for persons who are subnormal in all the traits and controls which make a good observer, as dispensary and clinic patients are apt to be.

There are, it will be remembered, two reasons for using a controlled pre-exposure. One is to eliminate the variable effect of what the eye has viewed immediately before, due to the effect of the after-image. In case a colored stimulus is used on a gray background of the brightness of the color and the pre-exposure is also to the gray, no after-image is given either on color or background. That is, in this case the effect of the after-image due to previous exposure is eliminated. In case a white stimulus on a black background and either a white or black pre-exposure are used, there is an effect of after-image because it is not possible to use a pre-exposure of the same brightness as both stimulus and background; but the effect is constant so long as stimulus, background, pre-exposure and other conditions of the experiment are maintained the same. That is, in case of the colored stimulus the after-image is eliminated, and in case of form stimulus the effect of the after-image is rendered constant. So far as the effect of the after-image, then, is concerned, the pre-exposure method is more effective in the use of color than in the use of form stimuli. This greater effectiveness is compensated for, however, by the fact that the need is greater for the color than for the form stimulus.

The other reason for the use of the pre-exposure method is its very excel-

lent service in the control of fixation. This service is equally great for both color and form stimuli and is in itself quite sufficient to justify the use of the method even if there were no other.

At this point the importance of method cannot be emphasized too strongly. Also the relation of an instrument to method should be understood. An instrument is important only as it makes it possible to carry out certain methods. Indeed, instruments have no other purpose. And above all, it should be stressed that good methods are much more necessary in clinic than in laboratory work just in proportion as in clinic work less reliance can be placed on the observer's intelligence, self-control, and obedience to instructions. One might add also that in clinic work the welfare of a human being is at stake, which is of greater importance than any abstract datum of the laboratory. Yet one is frequently told: These methods and precautions are all right for the laboratory, but they are not needed in the clinic.

Conditions under which the work was done

The fields were taken on the Ferree-Rand perimeter with strict observance of all the precautions prescribed for the use of this perimeter. With this instrument all of the external conditions of the test can be held constant and can be reproduced at will. The intensity of illumination was seven foot-candles. The stimulus was in every case the white of the Hering series of pigment papers, coefficient of reflection 78 percent. The final determination of the limits was made with the correct control of preexposure. Also the stimulus carriage was used throughout and not the rods intended for use with the tangent screen. In the first series of experiments a preliminary survey was made of the effect of relation of stimulus to background on size of field by using as backgrounds the 30 grays of the new series of Hering gray pigment papers¹, supplemented in the upper part of the

scale of reflection coefficients by two grays from the Munsell series². This survey showed that some of the backgrounds at the lower end of the scale of coefficients of reflection give the same or very nearly the same extent of field when used with the one degree white stimulus. These were discarded and the series of backgrounds finally employed were from dark to light: numbers 30, 22, 18, 10, 8, 7, 6, 5, 4, 3, and 2 of the Hering series and numbers 8 and 7 of the Munsell series. The coefficients of reflections of these backgrounds were respectively: 4, 8.5, 11, 19, 22.5, 26, 33, 35, 41, 60, 64, and 69 percent.

It may be noted that while the coefficients of reflection in the series are spaced rather widely in the upper part of the scale, the sensation differences represented are small. The white stimulus on a gray background having a coefficient of reflection of 69 percent, for example, shows very little difference in sensation from its background in central vision. This difference, however, is sufficiently enhanced in the mid-portion of the peripheral field to give it the subjective value needed in the series. Two reasons may be given for the subjective enhancement of brightness differences in this part of the field: (1) the greater sensitivity to light and to light difference in the para-central and mid-peripheral field; and (2) the greater sensitivity to brightness induction or contrast in all or the greater part of the peripheral field. The brilliancy with which a white stimulus stands out against its background in peripheral as compared with central vision is a phenomenon that may be noted by any careful observer.

In a second series of experiments the effect of variation of relation to background for stimuli of different sizes and conversely the effect of variation of size of stimulus for different relations of stimulus to background were determined. Five sizes of stimulus were used: 5.8, 4.4, 2.9, 1.5, and 1.0 mm. At

¹These papers may be obtained from C. H. Stoelting Co., Chicago.

²These papers may be obtained from Universal Color Standards, Inc., Baltimore, Maryland.

the distance of the arc of the perimeter from the observer's eye, 33 cm., these stimuli subtended visual angles respectively of 1, 0.75, 0.50, 0.25 and 0.17 degrees. Six backgrounds were chosen; the black provided with the perimeter for use with the white stimulus (Hering gray No. 30); a gray of approximately the brightness of the background provided for use with the red and blue stimuli (Hering gray No. 22); a gray of approximately the brightness of the background provided for use with the green stimulus (Hering gray No. 7); a mid-gray of approximately the brightness of the arc of the perimeter (Hering gray No. 10); and two grays lighter than any of these (Hering grays No. 4 and No. 3). The coefficients of reflection of these backgrounds are respectively: 4.0, 8.5, 26.0, 19.0, 41.0, and 49.0 percent.

Considerable difficulty was experienced in working with the 0.5, 0.25 and 0.17 degree stimuli on the lighter gray backgrounds. Three reasons may be assigned for this difficulty. (a) The intermittent visibility which is characteristic of stimuli of small area and small difference from the background in the peripheral field. This is very confusing to the judgment and renders a consis-

tent determination of the limits difficult to make. (b) The poor refractive conditions in the peripheral field and the consequent great distortion and blurring of the images of small stimuli. This makes the observation difficult particularly when the stimulus is white and the background is a light gray. And (c) the gradual slope of the sensitivity gradient for achromatic stimuli in the mid-periphery of the field. Unlike color stimuli whose sensitivity gradient is steep near the limits of the field, the form stimulus of low visibility is seen faintly near the limits of its field, in fact in all parts of its field. For it there is no well marked region of distinct visibility shading abruptly into the background, as there is for colors. A definite demarcation of the limit is therefore much more difficult to make. For all of these reasons form stimuli of very low visibility can not be relied upon to give a satisfactory reproducibility of result. Also they are not well adapted for use with sick patients whose attention is difficult to hold. When stimuli of this order of visibility are wanted, color stimuli are greatly to be preferred, particularly for the determination of the limits of sensitivity.

Table I

SHOWING THE EFFECT OF VARYING THE BRIGHTNESS OF THE BACKGROUND ON THE SIZE OF THE VISUAL FIELD FOR WHITE STIMULI OF DIFFERENT SIZES. COEFFICIENT OF REFLECTION OF STIMULUS 78 PERCENT. INDEX OF SIZE OF FIELD: AVERAGE BREADTH OF FIELD IN THE EIGHT PRINCIPAL MERIDIANAL QUADRANTS, EXPRESSED IN DEGREES.

Serial number of background	Coef. of refl. of background (percent)	Difference in coef. of refl. between object and background (percent)	Average breadth of field for stimuli of					
			1° (5.8/330) (degrees)	0.75° (4.4/330) (degrees)	0.50 (2.9/330) (degrees)	0.25° (1.5/330) (degrees)	0.17° (1/330) (degrees)	
Hering	No. 30	4.0	74.0	71.3	70.7	68.6	63.3	57.3
	No. 22	8.5	69.5	70.4	69.5	67.0	60.6	52.8
	No. 18	11.0	67.0	69.6				
	No. 10	19.0	59.0	68.3	67.4	64.2	53.7	43.7
	No. 8	22.5	55.5	67.6				
	No. 7	26.0	52.0	66.9	64.7	60.1	47.9	37.2
	No. 6	33.0	45.0	66.1				
	No. 5	35.0	43.0	65.0				
	No. 4	41.0	37.0	63.0	60.1	51.4	36.1	24.4
	No. 3	49.0	29.0	60.3	56.5	44.8	26.9	16.8
Munsell	No. 2	60.0	18.0	55.8				
	No. 8	64.0	14.0	44.6				
	No. 7	69.0	9.0	28.3				

The results selected for presentation in this paper were obtained with an observer especially trained in making difficult judgments in the peripheral field. However, to insure that the results obtained are typical, they were checked at critical points by other observers. Further, results obtained with this observer have been abundantly checked for both normalcy and reproducibility through many years.

Results

The results are given in table 1 and figures 1-4. In table 1 are given the data

on size of field for the various backgrounds for each size of stimulus used. Size of field is expressed in terms of the average breadth of field in the eight principal meridional quadrants; that is, the average distance of the limit in degrees from the center of the field in these eight quadrants. In column 1 is given the serial number of the background used; in column 2, the coefficient of reflection of the background; in column 3, the difference in coefficient of reflection between stimulus and background; in columns 4, 5, 6, 7, and 8 the average breadth of field for these backgrounds for stimuli subtending

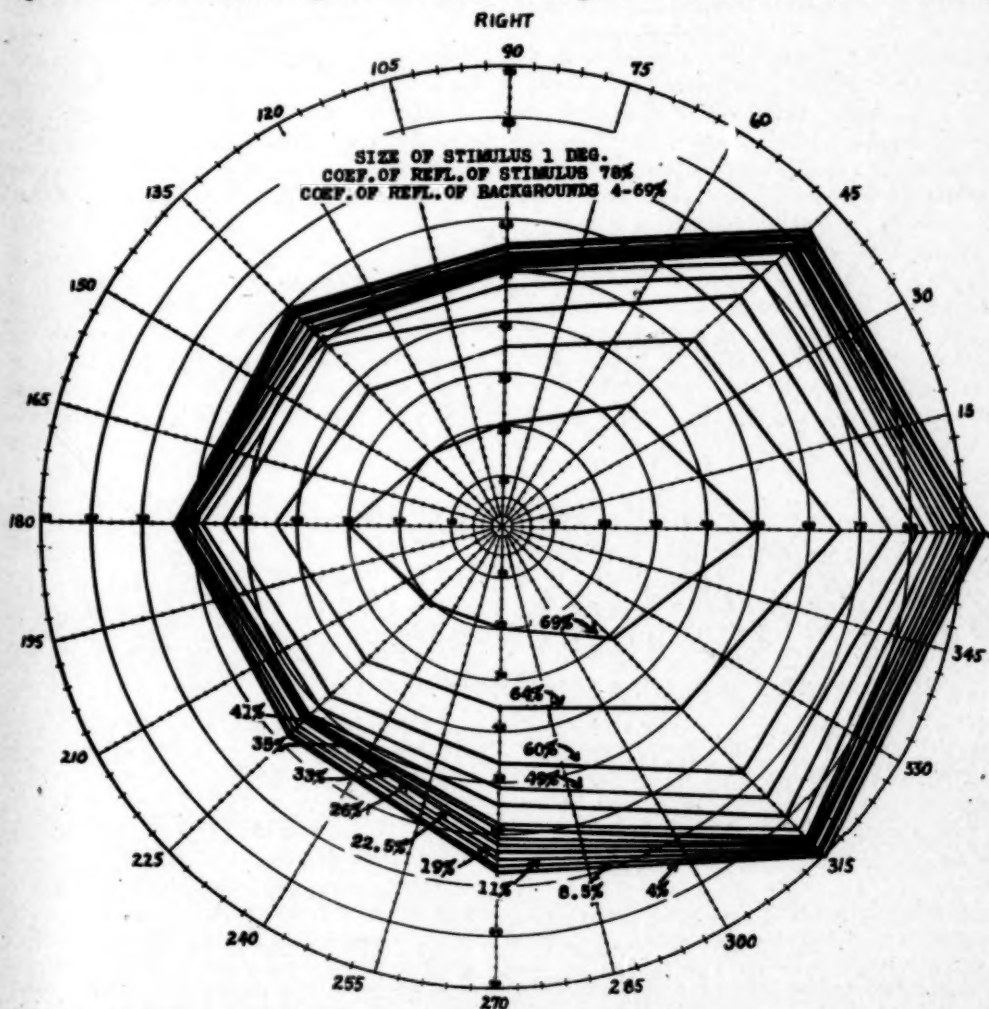


Fig. 1 (Ferree and Rand). Showing the effect on size and shape of the field for a 1 degree white stimulus by varying the brightness of the background. Coefficient of reflection of stimulus 78 percent; of backgrounds 4 to 69 percent.

visual angles of 1, 0.75, 0.5, 0.25 and 0.17 degrees respectively.

In figure 1 the effect of variation of brightness of background is shown for the 1 degree white stimulus. Thirteen brightnesses of background were used, ranging from 4 percent to 69 percent. The coefficients of reflection of these backgrounds are given in column 2, table 1. The darkest background was the black which is ordinarily used in the determination of the form field, the lightest was a gray so light that the

white stimulus was barely noticeable against it in central vision. It was the purpose of this series of experiments to make a representative determination of the sizes of field that can be obtained with a 1 degree white stimulus by varying its difference in brightness from the background from maximum to minimum, within the limits imposed by seven foot-candles of illumination and the pigments available for perimetric work.

In figure 2, A, B, C, and D the effect

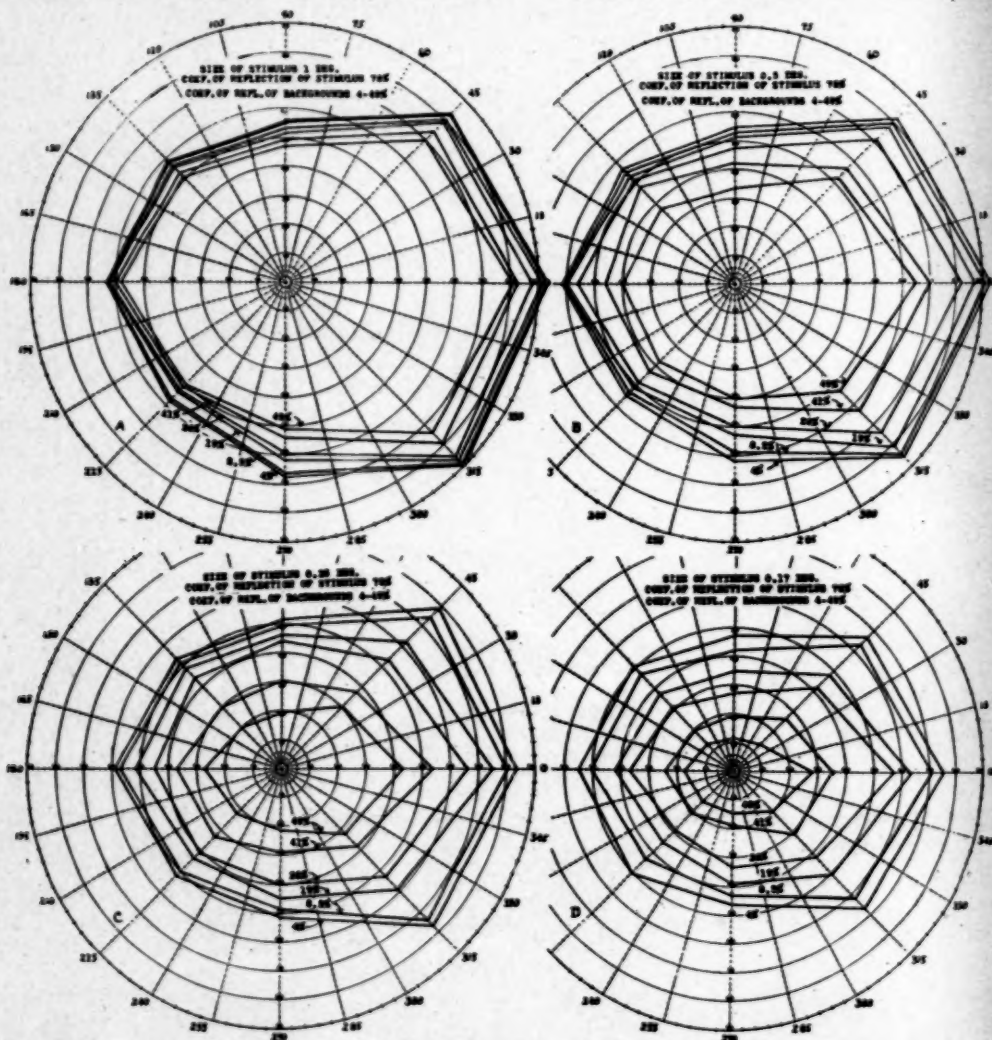


Fig. 2 (Ferree and Rand). Showing the effect of variation of brightness of background for different sizes of stimulus. Coefficient of reflection of stimulus 78 percent; of backgrounds 4, 8.5, 19, 26, 41 and 49 percents respectively. In chart A the effect is shown for the 1 degree stimulus; in B, for the 0.5 degree stimulus; in C, for the 0.25 degree stimulus, and in D, for the 0.17 degree stimulus.

of variation of brightness of background is shown for different sizes of stimulus. Six backgrounds were used (coefficients of reflection, 4, 8.5, 19, 26, 41 and 49 percent) for each of the sizes of stimulus, 1, 0.5, 0.25 and 0.17 degrees.

In figure 3, A, B, C, and D the effect of variation of size of stimulus is shown for different backgrounds. For this representation, black, mid-gray, and two lighter grays were selected (coefficients of reflection 4, 19, 26 and 49 percent respectively). The sizes of stimulus employed were 1, 0.75, 0.5, 0.25 and 0.17 degrees.

In figure 4, A and B, the relationship between size of field and the two variables: size of stimulus and difference in coefficient of reflection between stimulus and background, is given in the form of curves. As showing more clearly the type and scale of relationship that exists, these curves have considerable theoretical interest. They also have a great deal of practical value in a system of perimetry, as will be discussed later in the paper. In A the effect of variation of brightness difference between stimulus and background is shown for the different sizes of stimulus used; that is, curves are given for each of the different sizes of stimulus in which difference from the background (horizontal coordinate) is plotted against size of field (vertical coordinate). In B the effect of size of stimulus is shown for the different backgrounds. In this chart curves are given for each of the backgrounds in which size of stimulus (horizontal coordinate) is plotted against size of field (vertical coordinate).

The results shown in table 1 and figures 1-4 may be briefly summarized and discussed as follows:

(1) Relation of stimulus to background, as one of the cardinal factors determining the visibility of the stimulus, exerts a very important influence on the size and shape of the form field. The influence of this factor is comparable in importance with size of stimulus and intensity of illumination. This fact should be kept clearly in mind in plan-

ning the conditions for a perimetric examination. If a white stimulus is to be used on the gray arm of the perimeter or any other gray background for diagnostic purposes, norms must be determined for that condition. The results are not comparable, for example, with those which have been obtained with a white stimulus on a black background, or with norms determined for this latter condition.

(2) The influence of difference in brightness from the background is much greater for small than for large stimuli. For the 0.17 and 0.25 degree stimuli there is almost a straight line relationship between increase in size of field and increase in percent difference in coefficient of reflection between stimulus and background. For the larger stimuli the effect of the increase is not so great and is less regular. These results, it will be remembered, were obtained with a constant intensity of illumination. What the effect of size of stimulus and relation to background would be when varied separately or together at other intensities of illumination or with an uncontrolled illumination, can not be predicted. In a practice of perimetry in which size of stimulus is the only factor subjected to special provisions for control, considerable confusion as to results must ensue.

(3) For the larger stimuli, size of field increases rapidly with increase of brightness difference between stimulus and background near the lower end of the scale. Beyond this the increase is gradual. For the 1 and 0.75 degree stimuli, for example, the knee of the curve is reached with a difference in coefficient of reflection between stimulus and background of only 29 percent. This represents the difference between the white of the Hering series of pigment papers and gray No. 3 which is very light gray.

(4) Similarly the effect of variation of size of stimulus is much greater for small than for large brightness differences between stimulus and background. For the smallest difference used (29 percent) the knee of the curve is reached with a stimulus subtending

a visual angle between 0.75 degree and 1 degree; for the largest difference (74 percent) the knee of the curve is reached with a stimulus subtending a visual angle of 0.25 to 0.50 degree. The defective imagery and the low acuity in the peripheral field are doubtless very important factors in the effect of decrease of size of stimulus on the size of the field for the smaller sizes of stimulus. It seems reasonable to infer that defects in imagery exert a stronger

tendency to render a small than a large stimulus indistinguishable from the background, and it is certain that low acuity would play an important rôle in the amount of difference from the background that is required for the discrimination of a small stimulus. The results with small stimuli are thus unduly susceptible to errors in refraction and to individual differences in acuity, which is not the type of defect that perimetry is designed to detect.

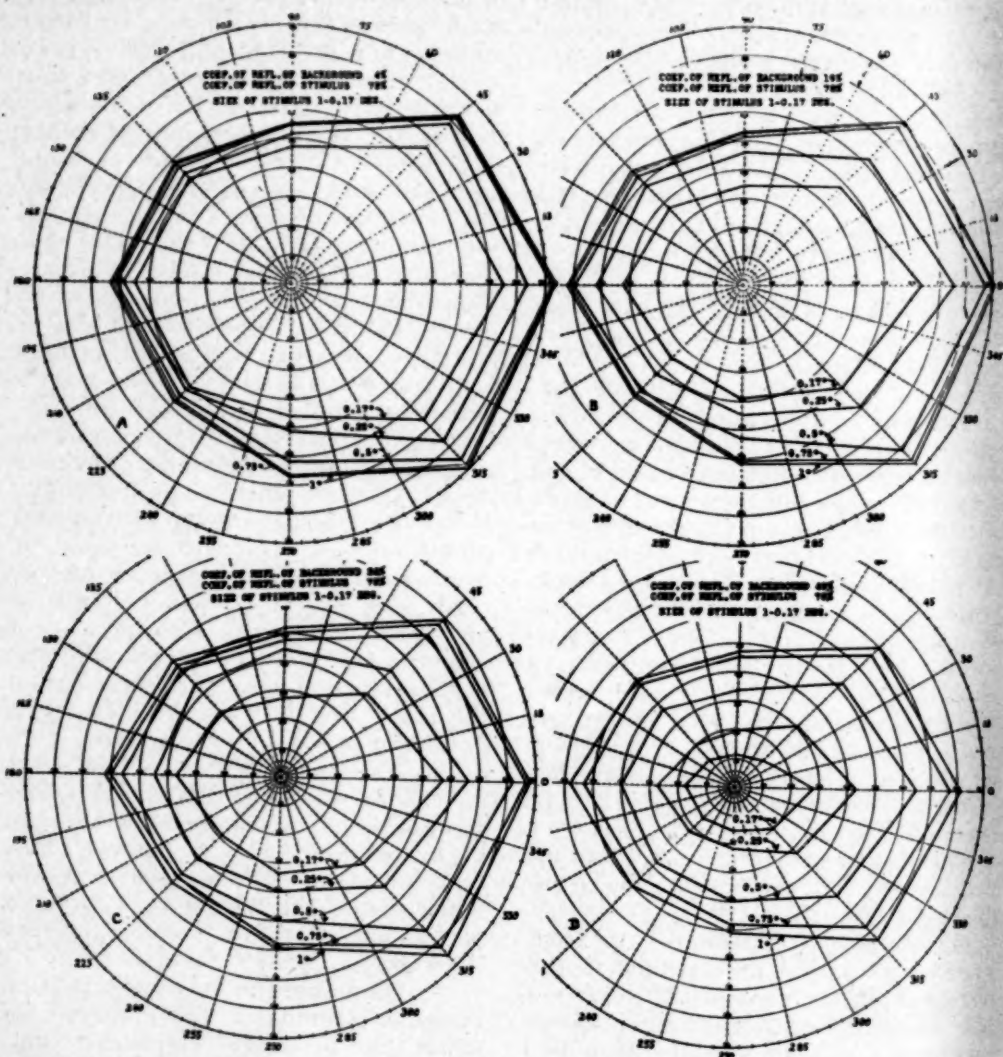


Fig. 3 (Ferree and Rand). Showing the effect of variation of size of stimulus for different backgrounds. Coefficient of reflection of stimulus 78 percent; sizes of stimulus 1, 0.75, 0.5, 0.25 and 0.17 degrees. In chart A the effect is shown for a background of 4 percent coefficient of reflection; in B, for a background of 19 percent; in C, for a background of 26 percent; and in D, for a background of 49 percent.

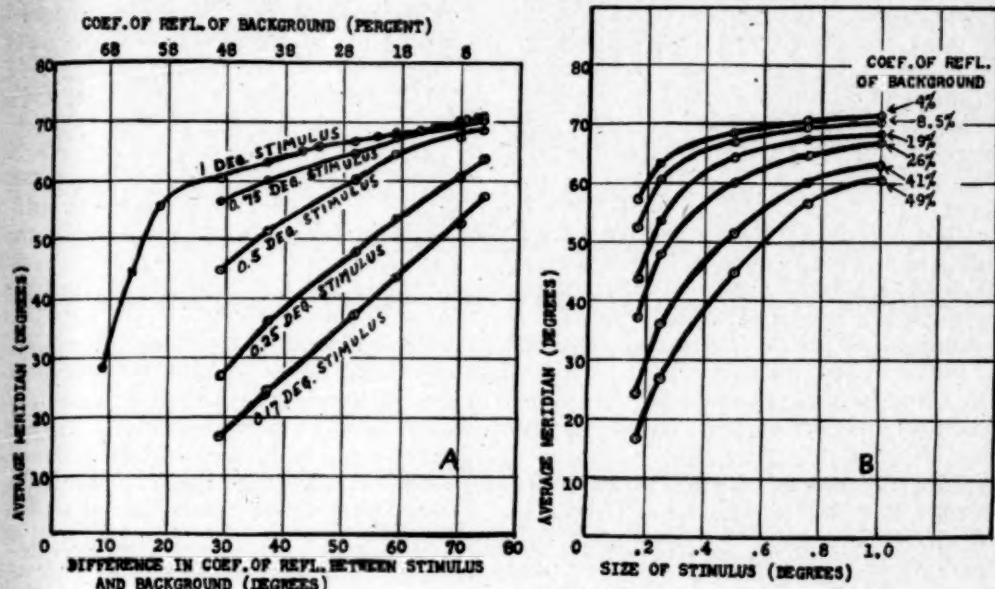


Fig. 4 (Ferree and Rand). Curves showing the relationship between size of field and the two variables: size of stimulus and difference in coefficient of reflection between stimulus and background. In A, the effect of variation of brightness difference between stimulus and background is shown for the different sizes of stimulus used; and in B, the effect of size of stimulus for the different backgrounds.

(5) From the fact that so small a cut in the size of the field was obtained by decreasing either the size of the stimulus or the brightness difference between stimulus and background when conditions which give very wide fields were used as the basis on which to determine the amount of cut, it can be inferred that the gradient of achromatic sensitivity is very steep in the extreme peripheral portions of the field. On the other hand, from the fact that a comparatively large cut in the size of the form field was obtained by decreasing either the size of the stimulus or its brightness difference from the background when conditions which gave fields of medium or small size were used as the basis on which to determine the amount of cut, it can be inferred that this gradient is very gradual in the mid-portions of the peripheral field. These inferences as to the shape of the gradient of achromatic sensitivity are in accord with the knowledge that we have of this point on the basis of direct experimental determinations.

It is obvious that the curves in figure 4 can be made to serve a very useful purpose in the practice of perimetry and scotometry. From these curves it can be very readily determined, for example, just what combination of size of stimulus and relation of stimulus to background is needed when a sensitive examination of some particular region of the field is wanted with a form stimulus. Several cases can be made of this.

(1) In scotometry, it can be determined from the curves just what combinations are needed to give stimuli which are at or near the threshold of visibility for any particular zone or region of the retina. This information is very useful in a delicate and careful search for scotomas.

(2) In perimetry a test of the functional condition of the retina is made only at or near the points in the field which are called the limits of sensitivity. The curves in figure 4 show what sizes of field may be expected with different combinations of size of stimulus and relation to background. In testing for pathological conditions

which have characteristic regions of locations of disturbance, this knowledge of relation of size of field to various combinations of size of stimulus and relations of stimulus to background is very useful information to have in advance of the test. Contraction of the field in incipient optic atrophy, for example, can often be detected with stimuli which give a wide field when they would be missed entirely with stimuli which give a narrow field; a thorough examination for the nasal step requires a series of stimuli that will give limits at suitably spaced intervals from the periphery towards the center, and so forth.

(3) If equivalent form stimuli of different sizes are wanted, the curves in figure 4 read from left to right from any point on the vertical coordinate show what combinations of stimulus and background are needed to give fields of approximately the same size.

(4) The curves in figure 4 are of great assistance in the selection of form stimuli which give fields of approximately the same size as color stimuli. Among the situations for which this equivalence is of value, the following may be mentioned: (a) The experimental determination whether there is a special affinity of the various pathological processes for the color sense; (b) the examination or study of the visual field for eyes which are color-blind; (c) any type of examination or study where preference is for a form rather than a color stimulus. With reference to the equivalence of form and color stimuli it may be noted that for the observer whose results are given in this paper, the field for blue averages 42 degrees in the eight principal meridional quadrants; for red 40 degrees; and for green 23.3 degrees. For the same observer form fields averaging between 40 degrees and 45 degrees are given by 1 degree white on gray, coefficient of reflection 64 percent; 0.5 degree white on gray, coefficient of reflection 49 percent; and 0.17 degree white on gray, coefficient of reflection 19 percent. Of these the 0.5 degree white stimulus on gray, coefficient of

reflection 49 percent, is the most feasible and practical to use when a form stimulus is wanted which will give a field approximating in size the fields for 1 degree red and 1 degree blue on backgrounds of gray of the brightness of the color. The reasons for this selection are that the 0.5 degree stimulus is sufficiently large to be outside the class of acuity objects and the background is not too light to be entirely impracticable for use.

We are at present making a comparison of the fields obtained for a number of observers with this stimulus and background with those obtained with 1 degree red and blue on gray backgrounds of the brightness of the color. So far, our results show that the size of field given by the three stimuli is nearly the same for any non-pathologic eye. The results for pathologic eyes do not as yet warrant even a tentative conclusion. As stated earlier in the paper, however, our chief interest in making the comparison was to determine whether the great sensitivity of color stimuli for detecting pathological disturbances is due solely to their low visibility or whether there is in addition a special susceptibility of the color sense to pathological influences. The possibility of finding a form stimulus which could be uniformly substituted for color stimuli in practical perimetry was not an important incentive to the comparison. Even if it can be shown, for example, that a 0.5 degree white stimulus on a light gray background (coefficient of reflection 49 percent) has as great sensitivity for the detection of pathological disturbances as 1 degree red and 1 degree blue, its substitution for the color stimuli in practical work for other than color-blind eyes could not be recommended on the grounds of feasibility. Because of the small size of the stimulus, the lightness of the background and the very small difference in brightness between stimulus and background, this combination, which was selected as the most feasible of those giving approximately the same size of field as the color stimuli, is much more difficult to use, much more trying for

the patient to observe, gives a poorer reproducibility of result, and is much harder to keep in condition for use than the color stimuli. In planning a series of stimuli graded as to visibility, for example, the recommended procedure is that form stimuli be used only until the level of visibility of the color stim-

uli is reached. Beyond this point the color stimuli are not only more feasible and convenient to use, but there is in addition a strong probability of a special and perhaps differential susceptibility to pathological disturbances.

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THE RELATION OF THE PARATHYROID GLAND TO CATARACT

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A chemical study was made of a number of normal dogs' lenses and of parathyroid cataract lenses experimentally produced in dogs. Analytical data on percentage of water, calcium, magnesium, potassium, phosphorus, and silicon thus obtained are presented and compared with other data on the subject. An increase in calcium and a decrease in potassium was found similar to that noted in senile cataract. An extensive review of the literature is presented. From the Department of Physiology, University of Chicago.

Recent literature on the subject of etiology of cataract is evidence that considerably more attention is being paid to this particular phase of the cataract problem than to surgical treatment alone. Prior to this century but little work had been done relative to the pathological physiology of the crystalline lens. And as Kirkpatrick¹ has pointed out, the extent of our knowledge with regard to the causes of the disease and the effectiveness of treatment once the disease has commenced, depend in a large measure upon the investigations into the physiological nature of the true cause of the disease.

Edward Jackson² has only lately remarked editorially of the possible connection of parathyroid gland dysfunction and cataract. It was because of reports of numerous observations of clinicians and laboratory workers of the apparent significance of the parathyroid gland in the etiology of cataract that this study was undertaken.

Literature

Fischer and Triebenstein³ report that 88.2 percent of patients examined by them showed latent tetany, and

these workers concluded that senile cataract was associated with parathyroid deficiency. Tron⁴, Polichova⁵, and V. Pellathy⁶ all investigated serum calcium of senile cataract patients and found only slight differences from the normal. Greppin⁷ thought tetany was due to parathyroid deficiency and states that 50 percent of his cataract cases were associated with tetany. Erdheim⁸, Possek⁹, Shiøtz¹⁰, Hiroishi¹¹, Luckhardt and Blumenstock¹², and Luckhardt and Eiseman¹³ have all recognized the connection between parathyroid deficiency and cataract. In a later paper, V. Pellathy¹⁴ has described the pathological anatomy of the cataractous lens brought about by previous parathyroidectomy.

It was Burge¹⁵ in this country who first examined the lenses of senile cataract patients for their inorganic constituents and whose work remains unchallenged in these respects. Burge called attention in this paper to a decrease of potassium from 38.8 percent ash of normal lens to 9.8 percent in cataractous lens with a corresponding increase in calcium content from a negligible quantity in normal lens to 12.5 percent in the cataractous lens. Having had no opportunity to make sodium and

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magnesium analyses on ash of normal human lenses, Burge made the assumption that normal pig lenses have about the same sodium and magnesium content as normal human lenses, so analyzed, for comparison with human cataractous lenses, normal pig lenses for sodium and magnesium. Having made this assumption, Burge showed an increase of sodium from 6.67 percent in normal pig lens to 25.06 percent in cataractous human lens. Burge's figures also show an increase in magnesium in human cataractous lens of 8.0 percent as compared to normal pig lens of 1.2 percent. In a later paper, Burge¹⁶ suggested from an analysis of these data two factors for the production of cataract; namely, (a) modification of lens protein and (b) radiation of short wave lengths by which the modified protein can be coagulated. Indeed Burge¹⁷ was able to produce cataract in goldfish by means of ultraviolet irradiation if these fish were allowed to stay in a bath of 0.8 percent calcium chloride solution or sodium silicate solution for ten days, with subsequent irradiation.

Adams¹⁸ has shown, however, that the mere increase in calcium content of the blood is not sufficient to cause cataract, nor does a persistent high blood calcium accelerate the development of naphthalene cataract. She has demonstrated that calcium salts acting on fresh ox lenses do not cause opacity except in unphysiological concentrations, nor do they act as sensitizers in the production of cataract by ultraviolet irradiations. Her figures for analysis of ash of normal and senile cataractous lenses demonstrate the same phenomena as did Burge's, that there is an increase in calcium content over that of the normal lens, with a decrease in potassium content.

The data of Adams on effect of ultraviolet light on alpha and beta crystallin of the lens in which these proteins show a certain sensitivity to solutions of calcium salts when irradiated are interesting and are quite in line with the reports of Hinrichs¹⁹ that ultraviolet radiation produces a slight opacity in the lens proteins which is enhanced by

presence of salts, particularly calcium, at time of exposure.

From the above it may be seen that these workers are nearly all agreed that there is a demonstrable change in calcium content in the senile cataractous lens and that lens proteins show a sensitivity toward calcium salts. Furthermore, the clinical observations of Wessely²⁰ who concluded that the crystals in cataract are calcium phosphate; Braun²¹, that crystals in lens of congenital cataract cases were probably CaCO_3 ; and Boente²², who found crystals of CaCO_3 in lens of senile cataract patient, all point out the fact that in some obscure way salts of calcium or the calcium ion are associated with cataract.

It was in the light of the results of the above investigations that the production of parathyroid cataract in dogs was undertaken, making again analyses of normal lens for comparison with analyses of cataract lens produced under carefully controlled laboratory conditions. It was thought that if some comparisons might be made between the experimentally produced parathyroid cataract and the senile cataract as observed in the clinic, some real advance might be made into the understanding of the causes of senile cataract.

Experimental

Only healthy dogs were used in this experiment. After an examination of both eyes of the dog had been made and a control period in which several determinations were made on various inorganic ions of the blood, including calcium, magnesium, sodium, potassium and chlorides, the dogs were submitted to a bilateral thyroparathyroidectomy under morphine-ether anesthesia. The dogs were allowed to convalesce, with daily administration of 1.5 gm. calcium lactate per Kg. per day, which has been shown by Luckhardt and Goldberg²³, Salvesen²⁴ and later by Dragstedt²⁵ to keep thyroparathyroidectomized dogs free from tetany. On the sixth and seventh days, no treatment was given of calcium lactate, and if then the animals did not develop parathyroid tet-

any, they were considered to have accessory parathyroids which had not been removed by operation, and were therefore not used in this study. Furthermore, only those animals which developed, in course of test periods for parathyroid deficiency, extreme signs of tetany, were used in this study, for Luckhardt and Blumenstock¹² noted a direct relation between the severity of the tetany and the rate of development and extent of the cataract.

The daily dose of 1.5 gm. calcium lactate per Kg. body weight was maintained as long as animals showed tetanic tendencies, which was usually for 40 to 60 days after operation, as shown by Luckhardt and Goldberg²³. Thereafter, the dose was withdrawn and the animals kept on a maintenance diet of bread and meat, care being taken not to give too much of the latter.

After 6 to 8 weeks, examinations of the lenses of the surviving animals were made with the Gullstrand slit-lamp and more often with the ophthalmoscope, by ophthalmoscopy at a distance and by oblique illumination. These examinations were made to the time the animals were sacrificed for analyses of lenses.

In connection with another study, blood samples were taken during the survival period and will be reported in another paper²⁶. The dogs at time of death had been in state of "parathyroid survival" for a period of 11 to 24 months.

The lenses were excised as soon as possible after the animals were killed with an intrapleural injection of CHCl_3 . Some of these lenses were used for respiration experiments in the Warburg apparatus; the others were escapulated, weighed and dried in a tared platinum crucible to constant weight at 85°C . After the respiration experiments, the other lenses were treated in the same manner.

Analytical procedure

The lenses were removed from the eyes immediately after anæsthetizing and placed at once into a weighed platinum crucible. The weight was taken at

once to 1 mg. The lenses were then dried in an electric oven at 85°C . to constant weight, care being taken not to heat to too high a temperature as they char very easily. After weighing, the dried lenses were ashed as sulphates, allowing 1 cc. of concentrated H_2SO_4 to 6 lenses. Heating was carried out at a low temperature until the lenses were in solution, then the sulphuric acid was driven off by increasing the temperature; finally the temperature was raised until the ash was white, care being taken that the ash was not subjected to dull red heat long enough to risk the chance of some loss of SO_3 . The ash was weighed after desiccation to 0.1 mg.

The residue was dissolved as completely as possible in water. A drop of methyl orange was added to make sure no sulphuric acid was left. A little hydrochloric acid was added to dissolve the remaining residue. The solution was then filtered quantitatively into a volumetric flask and made up to volume, allowing 4 lenses to each 10 cc. The filter paper was ashed in a weighed platinum crucible, and weighed again for silicon. Determinations were carried out on aliquots of this solution, using 1 cc. for phosphorus, 1 cc. for potassium, 5 cc. for calcium, 5 cc. for sodium, and 4 cc. of the solution from the calcium precipitation for magnesium.

The calcium was determined by the technique of Kramer and Tisdall²⁷, slightly modified. After the addition of ammonium oxalate the pH was adjusted to brom-cresol purple. The precipitated and centrifuged calcium oxalate was washed twice with a saturated ammonium oxalate solution in 0.5 percent ammonium hydroxide. The third washing was with 2 percent ammonium hydroxide. Titrations were made with $n/200 \text{ KMnO}_4$. The permanganate factor was redetermined in every experiment by means of standard sodium oxalate.

For phosphorous the technique of Fiske and Subarrow²⁸ was used, care being taken to use the same molybdate solution (I) in the standard and unknown. A compensation for trichloro-

acetic acid is not needed, and none was used.

The sodium was determined by the technique of Kramer and Gittleman²⁹ with slight modifications as worked out in Dr. A. B. Hastings' laboratory. After adding the potassium antimonate reagent, the sides of the tube were rubbed with a pyrex glass rod until a good heavy precipitate was formed. Then 4 cc. of 80 percent redistilled alcohol was added drop-wise from a burette with constant stirring. The rod was rinsed down with 30 percent alcohol and this same rod was replaced in the tube before titrating. The tube was covered and after standing 1 to 1½ hours, was centrifuged for 10 to 15 minutes. It was then inverted and drained on a filter paper for 5 minutes. The titration was carried out in the centrifuge tube, the volume having been made up to 10 cc. before titrating.

The technique of Kramer and Tisdall³⁰ with modifications by Dr. A. B. Hastings was used for potassium. After precipitation was complete the volume was made up to 5 cc. with water and 0.5 cc. of a 2 percent suspension of caprylic alcohol in water added. The tube was rotated until the precipitate

just began to rise and centrifuged at once for 10 to 15 minutes. The supernatant fluid was poured off by tilting the tube carefully so as not to let the precipitate run down the side of the tube. The tube was then drained and wiped with a filter paper and the washing repeated twice more. Very fine tipped centrifuge tubes were used to diminish the danger of losing precipitate.

Magnesium was determined on 4 cc. of the supernatant fluid from the calcium by the method of Denis³¹.

The silicon was determined by weighing the insoluble residue.

Results

It may be stated that throughout the survival period, even after the parathyroidectomized animals were free from any signs of tetany, the blood calcium level is low while the blood inorganic phosphorous is high.

Table I is constructed from data of Burge and our data on lenses of normal and parathyroidectomized dogs.

Calcium content

It appears from our data that the calcium content of the normal lens is about

Table I

BURGE

	Avg. Wt. Dry Lens Mgms.	Avg. Wt. Ash One Lens Mgms.	Percent K Ash	Percent Ca	Percent Mg	Percent Na	Percent Si
Normal Adult Human	58.99	1.40	38.80	?	?	?	0
Normal Adult Pig	137.70	3.40	34.30	0.08	1.20	6.67	0
Embryo Human	15.47	0.25	30.80	?	?	?	0
Cataract Human U. S.	34.42	0.58	9.80	12.50	8.00	23.82	0
Cataract Human India	92.30	1.52	5.81	6.00	1.60	25.06	3.63

EVANS AND KERN

	No. Lenses	Avg. Wt. One Lens Wet Mgms.	Avg. Wt. One Lens Dry Mgms.	Ash One Lens Mgms.	Per- cent H ₂ O	Ca Ash	Per- cent P	Per- cent Na	Per- cent K	Per- cent Mg	Per- cent Si
Normal Dogs	6	454	179	2.8	60.5	0.7	1.7	17.6	26.7	0.8	0
Normal Dogs	8	340	129	2.7	62.1	1.4	2.5	21.8	30.3	—	0
Normal Dogs	13	537	213	4.3	60.3	1.2	4.5	10.0	29.8	1.0	0
Normal Dogs	23	469	183	4.4	61.0	1.5	4.7	9.4	31.3	0.8	0
Cataract P.T.	10	427.5	149.6	2.8	64.0	28.7	1.1	17.4	21.6	2.0	0

1.2 percent of the total ash. No figures could be found for comparison with dog lens, but Burge showed that the amount of calcium in normal human lens is so small as to be impossible to analyze. In the normal pig lens, he reports a value of 0.08 percent of ash as calcium.

There seems to be established the clear fact that in senile cataract there is an increase in calcium content over that of the normal lens. Burge's and Adams' figures both show such an increase while from our data it may be seen that the calcium content is increased to twenty-five times that of the normal lens.

Potassium

The potassium content of normal dog lens is averaged as 29.5 percent of ash, comparing favorably with figures of Burge showing for normal human lens a potassium content of 38.8 percent of ash.

The potassium content of "parathyroid" cataract shows a decrease to 21.8 percent, a decrease of 8.0 percent of ash which we believe to be significant and which checks again Burge's data for human senile cataract, potassium content of 9.80 percent of ash, a decrease of 29.0 percent of ash from normal. Although one determination in our "normal" series is 26.7 percent potassium of the total ash, the general potassium content of the 50 normal lenses is well above 29.5 percent so that we feel the data do illustrate a real decrease in potassium content in the cataractous lenses.

Sodium

It is not thought that there is a demonstrable change in sodium content of the "parathyroid" cataract; it appears that there is some normal variation in sodium content of the normal lens.

However, Burge's figures show an increase in sodium content of ash of senile cataract lens of about 17.0 percent. In this respect our data do not check those of Burge.

Phosphorus and magnesium

There has been no increase in phosphorus content of cataractous lens as was expected, but, if anything, a slight decrease to 1.1 percent of ash of cataractous lens. This decrease is not considered significant.

The magnesium content appears to be the same in both types of lens, which data do not check those of Burge, who demonstrated an increase of about 6.0 percent of ash in senile cataractous lens over the normal lens ash.

Silicon

In no case have we been able to detect the presence of silicon in any lenses, either cataractous or normal. This is in line with data of Burge on normal and cataractous adult human lens, but he did show a silicon content of ash of 3.63 percent in cataractous lens from India.

Water content

The water content of normal dog lens is about 61.0 percent. The water content of the cataractous lens shows an increase to 64.0 percent. No figures could be found for comparison with dog lens.

It may be stated here that should a question arise as to why these cataractous lenses were grouped together for analyses, that our reason for doing so was to increase the reliability of our analyses and to show gross general changes rather than select individual changes. Adams¹⁸ and Salit³² both agree that there is a wide variation in calcium content of senile cataractous lenses, and for this reason we believed it to be to the benefit of our experiment to group the lenses for analyses rather than attempt to analyze minute quantities of the several inorganic salts in individual lenses.

Discussion

From the above data, the striking similarity of changes in mineral content of both senile cataractous lenses and cataracts induced by parathyroidectomy is evident, and one is inclined to conclude that the causes of each

type of cataract in some obscure manner may be substantially the same in each case. At least, we feel that these results should focus attention upon a more serious consideration of the rôle the parathyroid gland dysfunction might very probably play in the etiology of senile cataract. In this instance, we do not mean to imply that (as Burdon-Cooper²³ cautions against) to the increase in mineral content of lens alone is to be attributed the cause of cataract, but we do maintain that when in an experimental manner this increase in mineral content is brought about only by excision of the parathyroid glands that some serious notice should be taken of the rôle of these glands in the maintenance of normal conditions of the lens proteins. It is well understood by the authors that these changes in the lens may be caused not by the lack of the parathyroid hormone itself, but perhaps upon the lack of the hormone on the proper functioning of other systems in the animal body which in their normal activity keep the lens proteins in a stable state.

It is further evident from the above data on parathyroid lens cataract that there is not a deposition of $\text{Ca}_3(\text{PO}_4)_2$

stated again that in the parathyroidectomized dog the blood calcium is persistently low during the survival period while the inorganic phosphorous in a majority of cases is persistently high, so we feel that production of parathyroid cataract is in no direct way dependent upon the calcium content of the blood.

Because of the obvious importance of oxygen consumption in determining the metabolism of the lens (see Karr and Tassman²⁵, Schmerl²⁶, and Kronfeld and Bothman²⁷) and the stability of the glutathione system, the oxygen consumption experiments were made on several of the cataractous lenses from parathyroidectomized animals. It is unfortunate that these experiments had to be made at 20° C., so perhaps the only value of these data on oxygen consumption lies within the experiment itself and cannot be used for comparison with other data. It is believed, however, that by applying the proper temperature coefficient these data could be compared with other data taken at 37° C. The nitro-prusside test for presence of glutathione or cysteine was not made on these lenses as they were to be used for subsequent analyses.

Table II

		cu. mm. O_2 per hour @ 20° C.
Parathyroid Cataract	(11 mos.)	
	555 mgms.	1.67
	551 mgms.	4.83
Parathyroid Cataract	(11 mos.)	
	486 mgms.	3.2
	423 mgms.	3.4
Parathyroid Cataract	Very Early Cataract	2.3
	No. 2	1.06
Normal Lens	No. 1	3.4
Normal Lens	No. 2	5.0

in the lens after thyroparathyroidectomy as Greenwald²⁴ has suggested. It is thereby shown that the lens does not act as a depot for the increased retention of calcium and phosphorus which follows upon parathyroidectomy in the dog as shown by Greenwald.

Relative to statement of Adams²⁸ that "an experimentally produced persistent high blood calcium in rabbits does not cause cataract," it may be

These experiments were made in the Warburg apparatus, care being taken that no injury was made to the lens as Schmerl²⁶ had cautioned that a slight injury to lens capsule would markedly increase the oxygen consumption.

It is believed that these data check fairly well those of Kronfeld and Bothman²⁷ for rabbit lens if a temperature coefficient is applied. However, they may be a little high.

Schmerl³⁶ believes that in the beginning stages, every kind of lesion in the lens is characterized by an increased oxygen consumption. In no "parathyroid" lens does this seem to hold true and in a preliminary study on naphthalene cataract (early stage) this thesis is not borne out.

Of the lenses reported in this study of oxygen consumption, it cannot be said that they were in a state of late cataract, but rather at about a midpoint. The cataracts were of the typical aparathyroid type, an abundance of fine, flaky, crystalline deposits being present in the cortex, with a few powdery opacities in the nucleus. The lens had not become hard except in one case, and this case could not be used for oxygen consumption experiment. Undoubtedly, in a late cataract, the internal oxidative system is badly damaged and one should expect a decreased oxygen consumption in this type of lens, but it appears from these data that in early cataractous changes, the internal oxidative system is still in quite good order to carry on the metabolism of the lens.

Burdon-Cooper³³, in discussing the close relation of surface tension of aqueous humour in cataract and the diminished osmotic pressure and freezing point of urine suggests a kidney deficiency as the cause of cataract. Greenwald³⁸ has made the suggestion that there is an interference with renal function after parathyroidectomy due to decreased calcium concentration of the blood, with a decreased excretion of sodium and potassium. It may be stated in this connection with data on blood concentrations of sodium, potassium and chlorides on parathyroidectomized dogs in survival period show concentrations of these ions in accepted normal amounts, so that it does not appear from these data that there is a severe disturbance in renal function in parathyroidectomized animals.

Burger and Schlomka³⁹, Salit³², and Jess⁴⁰ all state that with increasing age there is a decrease in water content of the lens and that there is a decrease in water content of the senile cataractous lens. Salit has suggested that this de-

crease "may be a dehydration of lens protein." In this study with "parathyroid" cataractous lenses, there was found no decrease in water content but rather a slight increase. The variations in water content of the normal dog lens are slight and this increase of 2.0 percent water we believe to be significant. It may indicate a change in the permeability of the lens capsule which permits the calcium to enter causing first swelling with subsequent opacification (T. J. Williams).

The importance of the lens protein, effects of changes in osmotic pressure of the aqueous humour, and many other points have not been considered in this discussion because we believe existing data on the parathyroid cataract and other forms of cataract are not sufficient to warrant their discussion in this paper. The possibility of formation of complex salts of proteins with ions of electrolytes seems to have been established with the work of Northrup and his associates⁴¹ and we are of the opinion that data should be secured on the action of salts of calcium and magnesium with the proteins of the crystalline lens. It may be that in cataract we are dealing with complex salt formation of the crystallines with calcium.

Gortner and his associates⁴² have done considerable work on the question of the state of water in plant protoplasm. From a casual study of this problem of the relationship of proteins to water in the cell, the writers believe that it might be profitable to make a study of the state of water in the normal and cataractous lens. To date, as far as we are aware, no such attempt has been made to correlate these cataractous changes with any change of state which might occur in the water of the lens.

We wish to take this opportunity to thank Dr. Luckhardt, at whose suggestion this investigation was carried out, for his interest and help in the course of the experiments.

Summary

Analytical data on the quantity of water, calcium, magnesium, potassium,

phosphorous and silicon in the normal lens (dog) and "parathyroid" cataractous lens (dog) are presented and compared with other data on the subject. That there is an increase in calcium and a decrease of potassium in the parathyroid cataractous lens seems to be established with close correlation with senile cataract changes. Data on oxygen consumption at 20° C. of catarac-

tous and normal lens (dog) are given and discussion of their significance is made.

Because of the apparent correlation of existing data on the two types of cataract, the authors feel that serious consideration should be given the parathyroid gland dysfunction in the etiology of senile cataract.

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ACCIDENTAL VACCINATION OF THE EYELIDS

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In the case reported there was ulceration of both eyelids resulting in loss of lashes but no impairment of vision. Attention is called to the literature in which are found numerous cases involving lids, conjunctiva, and cornea. The cornea is especially susceptible to vaccinia and serious consequences, even loss of the eye, may follow its involvement.

Years ago accidental ocular vaccination was not a particularly rare occurrence. During the past ten years comparatively few such accidents have been reported in this country. Because of these facts it is probably worth while occasionally to remind those who use small-pox vaccine that accidental ocular vaccination is possible and may have very serious results.

Some time ago I was called to treat an eight year old girl for an infection of the eyelid. The child had been vaccinated on the leg one week previously by the health department of the city in which she lived. A vesicle had appeared at the site of vaccination on the sixth day. The eye condition was first noticed the following day.

I saw the eye two days after the first sign of inflammation and in that short time the eye presented an alarming appearance. It was swollen completely shut. There was a severe vesicular blepharitis and a profuse seropurulent discharge. The ocular and palpebral conjunctiva was markedly inflamed and swollen so that the cornea appeared sunken. There was no ulceration of the cornea.

The appearance of the lesion on the lid and the history strongly suggested that the child had suffered an accidental vaccination of the eyelid. She then admitted upon questioning that she had touched the wet vaccine with her fingers on the day she had been vaccinated. The vaccination had not been protected by a dressing.

Dr. G. F. Suker was called in consultation and confirmed the impression that the child had suffered accidental vaccination of the eyelid. Smears and cultures taken at the time were negative for any significant organisms.

The swelling and inflammation per-

sisted for five days, the temperature ranging between 101°F. and 103°F. during this time. The discharge became mucopurulent and there was an ulceration of the lid margin. The conjunctiva and cornea remained free of any ulcerous lesion. In spite of the marked inflammatory reaction the child had remarkably little pain.

After the fifth day the swelling and inflammation subsided rapidly. The upper lid remained greatly thickened at the palpebral margin and about three-fourths of its length was bare of lashes. This blemish marked the site of the primary vaccination ulcer.

Two days after the appearance of the vesicle on the left eyelid a similar vesicle appeared on the right upper lid. The lesion remained small. There was only a very mild inflammatory reaction and within a few days the lid appeared perfectly normal.

Treatment consisted of hot 2 percent boric acid solution irrigations every four hours. Instillation of 1 percent yellow oxide of mercury ointment twice daily and continual hot, wet boric acid compresses were used until the acute inflammation had subsided.

Nine months later the thickening of the lid margin was scarcely noticeable and the lashes were beginning to return over the epilated area. There was no distortion of the lid or other scarring. Vision was apparently not affected.

Numerous instances of accidental vaccination of the eyelids and cornea have been reported. After reading many of these reports several points seem particularly worthy of mention.

Vaccination of the cornea is a much more serious accident than is vaccination of the eyelids. Corneal involvement has resulted in blindness or necessitated enucleation of the affected eye in many

of the instances reported. Dr. P. Toulant¹ in 1930 reported one hundred cases of ocular vaccination. In twenty-seven instances the cornea was involved. One of these patients lost both eyes, five lost one eye, and six suffered reduced vision. He does not consider vaccination of the lid margin grave if confined to the lid.

However, severe scarring, distortion of the lid or adhesions between the lid and cornea may occur. Such a case was reported in 1920 by A. J. Bedell.² There are no references to similar cases in the American literature since 1920. Bedell in a very complete bibliography was able to find ninety-seven references to accidental ocular vaccination. Fifty-two of these cases were reported before 1900. He found only six references in the literature of this country.

Conjunctival vaccination is more severe, and usually results in ulceration, with marked infiltration of the cornea. The third type, a vaccinal keratitis, may be a primary lesion, or may be secondary to a palpebral lesion, but results in early ulceration of the cornea. If the eye is saved, complete healing may require six months to a year. Often in direct corneal vaccination the inflammatory reaction begins within a few hours following instillation of the vaccine. This phenomenon reveals a marked and peculiar sensitivity of this tissue to the vaccine. Most observers agree that the general immunization of vaccination is not shared by the cornea and several instances have been reported of corneal vaccination occurring within a few months following successful vaccination on the arm or leg.

Dr. M. L. Camus of France who has seen many cases of accidental ocular vaccination believes that some skin areas may be more resistant to vaccine than others and cites the case of an infant who suffered an accidental vaccination of the eyelid three months after a successful vaccination on the arm.

Dr. Camus says that the cornea is always receptive to vaccination no matter how great the immunization is otherwise and that this corneal susceptibility is due to a lack of immunizing substance in the aqueous humor. In support of this theory he removed the aqueous humor of a susceptible subject replacing it with serum from an immunized subject. He also instilled the immune serum frequently over the cornea of the susceptible subject. Attempted vaccination of the cornea was then unsuccessful, indicating a local passive immunity.

The result of this experiment suggests the use of immune serum as a therapeutic measure in accidental corneal inoculation as the immunizing agent is not destroyed by heat.

Dr. M. Sexe³ noting the similarity in appearance between a vaccinal corneal ulcer and a chancre tried treatment by an arsphenamine derivative and got excellent results with recovery.

Rollet⁴ reported forty-five cases of ocular involvement in small-pox all treated successfully with instillations of 1-500 methylene blue solution.

In closing may I emphasize that small-pox vaccine should be handled with great care at all times. Fresh vaccinations should be covered and protected for twenty-four hours or at least until they are thoroughly dry. The discharging ulcer should be cared for just as carefully. The attendant should wash his hands thoroughly after changing the dressings. The case reported by Dr. Bedell resulted from the failure of the attendant to take this precaution. If by chance a bit of the vaccine or discharge from the ulcer no matter how small should get in the eye of either physician or patient, cleansing should be immediate and thorough by means of lavage with a warm nonirritating fluid such as a normal salt solution.

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A MONTH'S SERVICE WITH DR. HOLLAND AT SHIKARPUR, INDIA

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A brief account is given of the type and number of cases seen in a month during the season the clinic is open. The astonishing total of 950 cataract operations were performed in this time with a high percentage of good results. More than half of the cases were bilateral extractions, which is found to be little added risk. Intracapsular extraction was the operation of choice. About an equal number of operations other than cataract were performed.

Holland's surgical eye clinic, at Shikarpur Sind, India, opened for the fifteenth season on January 1, 1931. During the latter part of December, Dr. Holland with his staff of assistants and nurses arrived from Quetta, Baluchistan, in order to have all in readiness for the busy routine, which would soon exact all their time and energy.

This charitable eye hospital begins work each year on New Year's Day and operations are continued up to the twentieth of February, when all surgical work ceases, so as to make possible the closing of the clinic by the latter part of February.

This year there were seen daily, except Sunday, about two hundred new cases, approximately one-quarter of which were cataracts ready for operation. These were operated on, the day of arrival. Many cases of lenticular disturbance were seen, complicated by glaucoma, in which light perception and light projection were lost. These were, of course, not interfered with surgically. In some cases of glaucoma associated with cataract, where there was light projection, a broad iridectomy was done and later the extraction was completed. Posterior sclerotomy was necessary in a few cases before operation. Tension was taken in every sur-

gical case with a McLean tonometer. Only a few cases of acute glaucoma were seen.

Trachoma is very prevalent in India and in some form was present in nearly all persons seen, but unless severe, was no complication for cataract extraction. If the trachoma was acute, medicinal and surgical treatment was administered before extraction was considered.

The tear sacs were examined in all surgical cases and if infected, were removed before extraction.

Patients with bilateral cataract were operated on at one sitting with excellent results. Double extraction was done at one time because these people of India who come to Shikarpur seeking their sight may never be able to come again. The distances are great and their methods of travel are only primitive. They arrive on camel back, on ox-carts and on foot from across great stretches of desert land. The experience after operations on thousands of cases at this clinic and at most other eye clinics in India, has proved that there is no extra danger in this double extraction. As an example, this year, bilateral extractions exceeded single extractions by one hundred percent.

Up to January 28, over nine hundred and fifty cataract extractions had been

done, with only one case of infection in which the eye was lost. There had been ten cases of choroidal hemorrhage, but all had occurred in glaucomatous eyes and were poor risks to begin with. In a small number of cases, expulsion of the lens occurred with some loss of vitreous, due to squeezing, which could not be prevented, but good results were secured in the majority of these cases.

Dr. Holland personally saw all new patients and made a rapid diagnosis in each case, as there was little time for much individual study.

The majority of cataract operations were intracapsular, using the Smith method of extraction. In this type of operation, it is of great importance that one had a well-trained assistant to hold the lids. Dr. Holland has two native assistants who have helped him with thousands of such operations and who are very competent. After the iridectomy, the speculum is removed and the upper lid is lifted up and forward on the lid retractor, while the fourth and fifth finger of the hand rest on the brow and control the orbicularis. The lower lid is controlled by the thumb of the other hand.

In cases where the lens did not readily present itself the speculum was removed and an extracapsular extraction was done. An iridectomy was done in practically all cases. A capsulotomy was performed on all juvenile and early cataracts as well as on cases of complicated cataract, high tension cases and on ox-eyed individuals.

The good results that followed these surgical cases, is remarkable when one considers the small amount of preparation and after-care they received. A thorough cleaning of the eye and adnexa was done with a 1:3000 bichloride solution, and in all cataract cases the lashes were cut. Very little after-attention was given the patients, except what they received from their own relatives or friends. Cataract patients were kept quiet for the first twenty-four hours and unless some complaint was made the dressings were not removed until the fifth day. If, at the first dressing, there was any sign of deep irrita-

tion, atropine was instilled daily. Every patient was seen morning and night and if any were suffering from pain the eye was carefully examined. The average patient left the hospital on the ninth day.

Several cases, at the time of the first dressing, revealed a discharge from the conjunctiva but a gentle irrigation with a weak solution of bichloride soon removed all traces of infection. Only one case of panophthalmitis developed from cataract work.

Cataracts occur at a much earlier age in India than in the West. Many are operated on under forty years of age. The prevalence of brilliant sunlight and heat is considered the cause. The head covering used by natives does not in any way shade the eyes from the rays and heat of the sun. There may be a tendency for acquired cataract to develop earlier in each succeeding generation.

The largest number of operations for cataract done in any one day was 86, and the smallest number was 23, which was the opening day of the clinic. The average number of lens extractions daily was 40 and the average number of other eye operations was 42, making a total average of 82 daily.

During this time more than 3,500 cases were seen and over 2,000 operations were done, approximately half of which were cataract extractions. Of this number, there were 620 cases of double cataract, 127 cases of right and 204 cases of left-sided cataract. There were seen 331 cases of glaucoma, about half of which were surgical. There were 512 of leucoma, 168 of which were improved by operation. There were also seen 287 bad cases of trachoma at the clinic and the majority of these were operated on by scraping or rolling. Only ten cases of progressive myopia were seen, but no surgical interference was attempted. There were three cases of sarcoma of the orbit and one of glioma. Juvenile cataract was found in 24 cases and all were operated upon. Eight cases of retinitis pigmentosa were seen as well as the same number of cases of primary optic atrophy. Very

little squint was noted, but this condition apparently does not cause any worry and the patients are not at all anxious to be operated on for its correction.

Four operation tables were kept busy the greater part of each day. In one room were two tables reserved for cataracts and operations on the anterior segment. An adjoining room was set aside for other types of eye operation.

Few persons presented themselves for refraction and these were mostly for presbyopic correction. Refraction was not encouraged as there was little time to correct errors. Exceptions were

cases of aphakia. Not all of these patients, however, would submit themselves for refraction, but as soon as they could leave the hospital, mounted their camels and returned to the desert.

From the United States, it takes nearly a month to reach Shikarpur, going by water to Bombay and Karachi, then by train into the Sind country. One is well repaid for his long trip by the vast amount of surgical material seen in this clinic, as well as by a most interesting journey. Applications to Holland's clinic are filled for several years in advance and one is fortunate, indeed, to have an opportunity to work there.

NOTES, CASES, INSTRUMENTS

RAPID HOT CELLOIDIN METHOD OF IMBEDDING WHOLE EYES FOR MICROSCOPIC STUDY*

F. BRUCE FRALICK, M.D., AND
MARY ELLEN FRALICK, A.B.

ANN ARBOR

To those interested in ophthalmic pathology, the time required to imbed the specimens in celloidin has often been irksome. One's interest often lags before the eye is ready to section and stain. The method of hot celloidin imbedding given in this article allows one to have sections of the whole eye for study within two weeks from the time of enucleation as compared to several months required by the commonly used cold celloidin imbedding methods.

We have had no success in sectioning whole eyes imbedded in paraffin due to the size of the blocks and density of the sclera and lens. The method of Apáthy, who used a combination of celloidin and paraffin, we find too costly even though exceedingly well suited to ophthalmic work. Jeffrey's improvements on the ordinary cold celloidin method, by means of which it is possible to secure microscopic sections of wood, pointed out to us a rapid and economical method of celloidin imbedding of whole eyes which has been used in the laboratory of the Department of Ophthalmic Surgery of the University of Michigan for the past three years. We wish to give full credit for the development of this method to the above authors and only hope to call it to the attention of those interested in ophthalmic pathology. We feel that we obtain less distortion of our tissues, less tearing of the tissues on sectioning, and far less tendency to air bubble formation in our blocks than with the cold celloidin methods.

The method in detail and the materials and equipment needed as devised in our laboratory are herewith given that our experience might be profitable to those contemplating the establishment of their own laboratory or to speed up

the process in already established laboratories.

Equipment

(1) Incubator: One which can be maintained automatically at 50°-60° C. is essential.

(2) Specimen bottles: Ordinary wide necked specimen bottles which are used in all hospitals are suitable. A bottle with a wider neck or straight sides would be a great advantage but to have bottles especially made for this purpose materially increases the cost. Those used in this laboratory are the Thomas 1015 specimen bottles, 100 cc., with extra wide mouths. One eye is imbedded in each bottle.

(3) Grade A corks, No. 25, to fit the above bottles are needed. The best grade of corks obtainable prevents leakage from the bottles, thereby preventing air bubble formation in the celloidin.

(4) Bottle clamps for keeping corks from blowing out and preventing leakage of vapor from the bottles as in Fig. 1, were made in the University shops

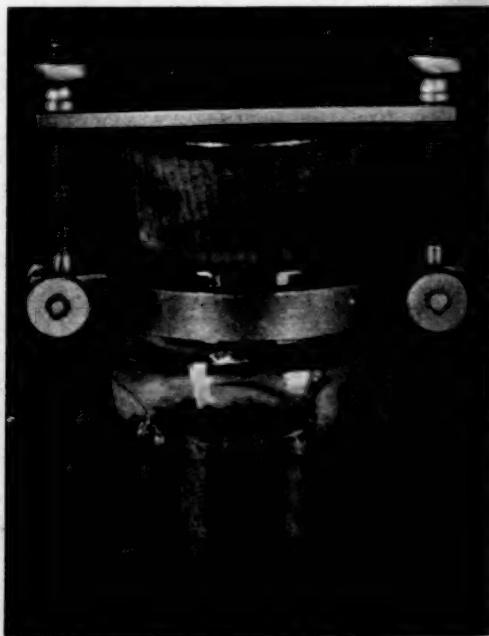
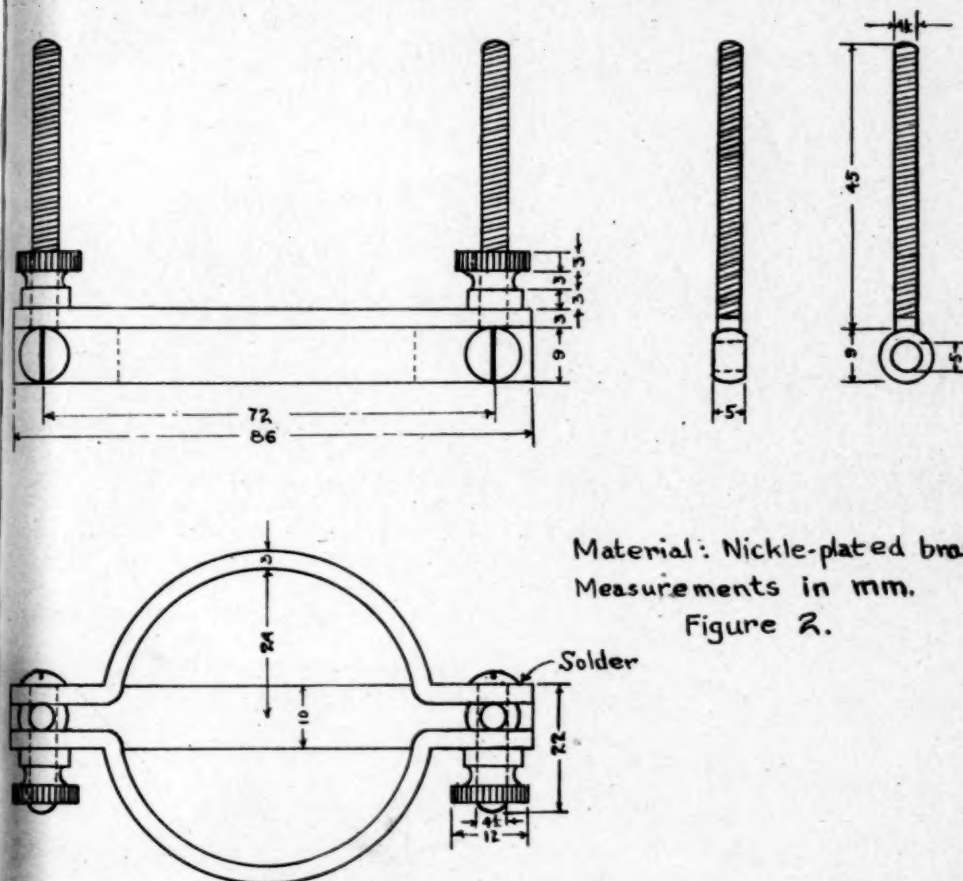


Fig. 1 (Fralick). The bottle clamp in place.

for us and can easily be made by a machinist from the accompanying diagram (Fig. 2). We place a large metal washer between the cork and cross bar, thereby securing uniform pressure on the corks.

(5) Celloidin: This may be secured in the form of collodion cotton from

gested that solutions of celloidin were obtained much quicker if the dry celloidin be first allowed to swell for twenty-four hours in the necessary absolute alcohol and the ether be added afterward. These celloidin solutions should be shaken before using as they



Material: Nickle-plated brass.
Measurements in mm.

Figure 2.

Fig. 2 (Fralick). Diagram of bottle clamp.

either the Charles Cooper Co., 194 Worth St., New York, or from the Eastman Kodak Co. These contain about five percent moisture which is considered in making up the different percentages of celloidin solution, i.e., 2, 4, 8, 10, 14, and 16 percent. Stock bottles containing 500 cc. of the celloidin solutions are kept on hand. The required weight of collodion cotton to make up the percentage celloidin needed is placed in the bottle and equal parts of absolute alcohol and ether added to make up 500 cc. In 1893, Elschnig sug-

tend to become slightly thicker at the bottom of the bottles upon standing.

(6) Purified pyroxylin: This is secured from the Mallinckrodt Chemical Works, New York or St. Louis.

Method. The eyes are first fixed in one of the rapid fixatives, preferably Held's, Sousa's, Zenker's, or other fixatives which give the minimum of shrinkage of the tissues, thereby allowing the tissues to maintain their normal relations. After fixation and dehydration through 35, 50, 70, 98 percent and absolute alcohols, the eye is oriented

and gross external findings noted. The calottes, or side slices, are then ready to be removed. One at least of the calottes should open the anterior chamber, thereby allowing the celloidin access. The calottes may be cut wherever desired, depending upon the location of the known lesions in the eye which we wish to preserve in the central segment of the globe. After noting gross internal findings, the eye is then ready for imbedding in celloidin.

(1) Two percent celloidin: The eye is placed in the specimen bottle and celloidin added sufficient to cover. The bottle is then corked tightly as noted in Fig. 1 and left in the incubator at 55°C. for 48 hours. The bottle should not be opened until it has been allowed to cool, as air bubbles will form in the celloidin upon relieving the contained alcohol-ether vapor before it has condensed. This applies especially to the higher concentrations of solutions. While in the incubator at 55°C., the inclosed alcohol-ether solutions partially vaporize, creating a considerable pressure upon the celloidin and bottle. Except for defective bottles, this pressure is never sufficient to rupture the bottle. After the bottle is cool the celloidin may be poured off and except for the 2 percent solution, may be used several times until it becomes cloudy.

(2) Four percent celloidin 12-24 hours at 55°C.

(3) Eight percent celloidin 12-24 hours at 55°C.

(4) Ten percent celloidin 12-24 hours at 55°C.

(5) Fourteen percent celloidin 2-4 hours at 55°C.

(6) Sixteen percent celloidin 1-2 hours at 55°C. After this solution has permeated the tissues, add small chips of purified pyroxylin from time to time till the solution barely flows while warm. After removing the bottle from the incubator, allow to cool and then fill bottle with commercial chloroform and let stand for 24 hours, after which time the block may be cut out of the bottle by means of a long thin knife. The peripheral ring of celloidin is then easily removed and the central block of

celloidin containing the eye can be removed from the bottle and trimmed to the desired size. The block is again dropped into fresh chloroform and allowed to harden for 48 hours or longer. Usually when the celloidin block no longer floats in the chloroform it is sufficiently hard to section without tearing. The base of the blocks are slightly softened in absolute alcohol-ether and the block mounted on the wood block by means of 16 percent celloidin and hardened in chloroform.

Chloroform often clouds the celloidin somewhat but this clears in the storing solution consisting of equal parts of glycerine and 96 percent alcohol, into which solution the block should be placed for 12-24 hours before sectioning.

Sections are cut under waste alcohol. Serial sections may be made, staining any desired number of sections. The remaining sections are preserved between individual pieces of marked filter paper along with the remaining uncut block in the above glycerine-alcohol solution in labeled specimen bottles.

The above method has been purposely given in detail in the hope that no step will be obscure to the reader as is so often the case in descriptions of laboratory technique. We are indebted to Professor Walter R. Parker for permission to publish this paper from the Department of Ophthalmic Surgery, University of Michigan.

University Hospital.

PERIODICAL EXCRETION OF CALCIUM URATE FROM THE CONJUNCTIVA

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CALCUTTA, INDIA

A girl aged twelve years presented herself with the following complaints: excretion, at about 3:00 P.M. every day, of sandy matter from the eyes, accompanied by pain in the eyes and temples. This had lasted for about a month.

About a month previously the patient had had pain and a sensation of foreign body in the left eye accompanied by

temporal headache and vomiting. During this pain, a milky fluid came out of the left eye. Part of this fluid dried at the inner and outer angles and along the lid margins. When removed this was found to be of sandy consistence. During the attack the girl could not close her eyes completely. Each disturbance lasted for about half an hour, after which she felt some relief. At first she was treated by some eye lotion at a hospital. This therapy stopped the secretions for about a week after which there was a recurrence of all the symptoms. About two weeks later the right eye became similarly affected. This phenomenon at first occurred twice a day, one attack at 9:00 A.M. and another at 3:00 P.M., but now it has been occurring only between 3:00 and 4:00 P.M.

The lids were normal, except for slight redness of the margins of the lower lids. There was a somewhat velvet appearance of the palpebral conjunctiva, especially marked in the lower left lid. Argyrosis was considerable in the left eye. Secretions seen at about 7:00 P.M. were found to be lying in the fornix like threads of mucus; a small collection was seen in the inner and outer angles and along the lid margins, especially along the root of the eye lashes. The father of the patient collected about a gram of gray secretions on cotton wool which had come out during an hour. It imparted a gritty sensation to the fingers when pressed.

The vision of both eyes was 5/5 but the fields were contracted. The discs were hyperemic and the retinal luster and light reflex were lost in places. There were also signs of perivascularitis. Otherwise the eyes were normal.

The patient was undersized, thin, with harsh and dirty looking skin, and there was little body hair. The intelligence was good. The tonsils were enlarged, two teeth were carious, the appetite was poor, and the bowels were constipated. She had had epidemic

dropsy two years previously and typhoid fever four years ago.

The urine under the microscope was loaded with urates, uric acids, calcium oxalates and a few phosphate crystals. The blood: Hb. 60 percent; W.B.C. 20,000; polymorph. leuks. 66 percent; large monos. 5 percent; small monos. 28 percent; eosinophils. nil. Arneths count: I, 16 percent; II, 45 percent; III, 27 percent; IV, 19 percent; V, 2 percent. Chemical examination of the conjunctival secretion showed calcium urate and silver in the left eye.

A milk and vegetable diet was ordered and cod liver oil. The following prescription was to be taken twice daily:

Arrhenal	gr 1/16
Calcium Glycerophosph	gr V
Thyroid	gr I
Parathyroid	gr 1/20
Strychnine Sulph	gr 1/400
Auri et Sodichlor	gr 1/16
Ferrum Phosphate	gr II

Nothing was prescribed locally for the eyes.

About a month later the patient reported that improvement had started by the third day, and that she was entirely free of symptoms after the first week. A mild attack of influenza had then caused a slight recurrence. The conjunctiva still had a velvet appearance but the retina had regained its color, though the signs of perivascularitis had remained. In addition to the first prescription "Makaradhwaj" (Merck), gr. I, was ordered. At the end of the second month the father reported that the girl was entirely free from symptoms.

Obviously this was a disease of faulty metabolism of the whole system, the eye having its due share as a part of the organism. Evidently protein and calcium metabolism was at fault. Evidence points to some defect in the sympathetic endocrine mechanism. The case is remarkable in its periodicity and excretion of calcium urate from the eye in such large quantity in the short time.

17-2 Beadon street.

SOCIETY PROCEEDINGS

Edited by DR. H. ROMMEL HILDRETH

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

January 20, 1931

DR. S. JUDD BEACH presiding

Ophthalmology in aviation

DR. WILLIAM F. HOLZER read a paper on this subject which will appear later in the American Journal of Ophthalmology.

Discussion. DR. J. HERBERT WAITE stated that with fifteen thousand licensed pilots in the United States, there could be no doubt that the services and advice of ophthalmologists would be increasingly sought.

In his interesting historical résumé of aviation by man, Dr. Holzer mentioned the first crossing of the English Channel in 1785, in a balloon by an American named Jeffries, and a Frenchman named Blanchard. This event was of particular interest to us as ophthalmologists, since the son of this intrepid aviator was none other than John Jeffries, a co-founder with Reynolds of the Massachusetts Eye and Ear Infirmary, and the grandson was Benjamin Joy Jeffries, an ophthalmic surgeon at the Infirmary, and the author of the then standard treatise on color vision. Incidentally, the balloon envelope which generated such international interest still reposed in the Jeffries' homestead on Chestnut street, Boston.

Dr. Holzer had reviewed the current methods for examination and licensure of pilots in civil aviation, in use now for about five years. As in other lines of endeavor, perfection of method had not yet been attained. It was still a question whether depth perception deserved the importance given to it in assessing the competence of the candidate for license. We knew of successful one-eyed pilots. The present method for testing depth perception was not fool-proof, and could be solved fairly well by parallax, and by muscle sense.

Depth perception was at its best within close range, and it became less and less informative at those distances at which the pilot must begin to maneuver for landing. Research was needed into other factors which contributed to safe landing.

In spite of increasingly common night-flying, at present no effort was being made to measure the dark-adapting ability, either light minimum or light difference, of the prospective pilot. The only protection now operative in this respect might be assumed to be an early crash on the part of the pilot unfortunate enough to possess defective light sense. During the past five years at the Infirmary, standard data on the light sense had been collected, with all variables rigidly controlled. He thought that we might say that we knew what the light sense norm should be. Portable adaptometers were now available, and there was no doubt that measurement of the light sense should be afforded to all candidates for flying license.

DR. WALTER B. LANCASTER asked what authority established the standards and tests which candidates for licenses must pass. In the Air Service of the Army, he said, they were set by the Medical Department of the Army.

He also wished to know just how important all these requirements were, and if they were set by the Medical Department of the Army.

He also wished to know just how important all these requirements were, and if they were based largely on theory. It might be recalled that in 1924, and again in 1925, a committee of the Ophthalmic Section of the American Medical Association tried to secure the adoption of some extremely high standards for all who drove automobiles. They proposed that no one with vision lower than 20/100 in the poorer eye should be permitted to drive a car unless he had 20/30 vision with-

out glasses in the other eye, plus normal hearing in both ears, full capacity in all other respects physically, and was mentally alert. In advocating this, some speakers waxed eloquent over the appalling number of automobile accidents. The national secretary of the Society for the Conservation of Vision was asked to furnish a list of automobile accidents traceable to defective vision, and she was unable to find any. To speak of the appalling number of accidents due to poor vision was gross exaggeration.

DR. LANCASTER stated that the way to settle these questions, both for motor-ing and for flying, was to accumulate accurate data of actual mishaps, and find out whether there was a true and accurate correlation between certain ocular deficiencies and accidents.

He said that certain ocular defects predisposed to flying mishaps, but perhaps the importance of others was over-estimated. Well-established facts were needed, but until they were obtained theorizing must be depended on. It was said in the Air Service that after the man had crashed, and was dead, he could not be examined for ocular deficiencies; but if all pilots were examined before they were licensed, it would be possible to trace accidents in which the pilot had visual defects. It could then be shown that the accident was due, not to a defective motor or plane, but to defective eyes. The importance of the evidence would grow with the number of cases collected.

Regarding stereoscopic vision, Dr. Lancaster was not convinced that it was highly important, although he realized that it was a desirable faculty to have in making good landings.

DR. S. JUDD BEACH quoted a pilot who said that he felt that most landings, especially at night, were made by watching the horizon, without the use of depth perception. This, Dr. Beach said, accords with Dr. Wells' idea that depth perception tests were relatively unimportant, however, pilots who could pass the present requirements made much the best fliers.

For night flying, a test for efficiency

under dark adaption would be as logical as testing the light sense.

There was much to be learned about the importance of color vision. Because a man did not see the difference between the green of grass against the yellow sand exactly as we did, did not mean that he could not distinguish between them.

DR. DAVID W. WELLS reported that some years ago when Dr. Howard was interested in this work, he accepted Dr. Howard's statements at their face value, and felt that stereopsis was an important factor for an aviator. With regard to the measuring of stereopsis, Dr. Wells stated that he exhibited here some years ago an apparatus which seemed much simpler than the Howard apparatus. He had been carrying on these examinations with this apparatus since that time, and in all cases of stereoscopic training, Dr. Wells had taken the depth perception for distance, as well as stereoscopic perspective for near, and had in preparation a paper discussing the relation between the two. He thought that about 2 to 3 cm. difference in the distance of two objects was all that could be asked at a distance of twenty feet.

Since the announcement of Dr. Holzer's subject, Dr. Wells received fifteen consecutive cases to see what effect stereoscopic training had on stereopsis. Theoretically, stereoscopic perspective at the near point should correspond to stereopsis at 6 m., and improvement in one should show an equal improvement in the other. This fact was borne out in a review of fifteen cases showing the depth difference before and after stereoscopic training. Dr. Wells stated that he was not able, however, to decide what relation this had to aviation.

In answer to Dr. Lancaster's question as to whether some cases projected the rod beyond the point instead of nearer, he said that he had not noticed it. Dr. Wells stated that he used two lights instead of rods, and said that some cases were quite illogical in their interpretation of stereoscopic perspective.

Dr. LANCASTER stated that the horopter was determined by moving a rod back and forth until it appeared in the same plane, the same distance away as another rod set up as a standard: the movable rod was placed on the horopter curve passing through the standard rod. In exophoria, he said, it was found that the rod was set farther away from, instead of toward the observer as was normal.

Dr. Holzer had said that those with exophoria tended, in landing, to locate the ground too far off, and Dr. Lancaster believed this had some relation to the horopter. Professor Ames, who was studying the horopter in an intensive way, had found that with prisms to correct the exophoria, the observer would then adjust the rods no longer too far away, but forward as in a normal horopter. Dr. Lancaster suspected that prisms, and perhaps Dr. Wells' training exercises, might help the exophoric flier in his landings.

Xanthomatosis

Dr. EDWIN B. DUNPHY presented a male child, four years of age. About February, 1929, the parents first noticed that the child was extremely thirsty, had frequent micturition and loss of weight. A bulge in the occipital region was noticed, and the left eye was proptosed.

About November, 1929, the speech became defective. In May, 1930, the child became deaf and very irritable. He was sent to the Childrens' Hospital, and a diagnosis of xanthomatosis, or Christian's syndrome was made. This was a disturbance of the fat metabolism of the body, causing defects in the bones, and diabetes insipidus. X-rays showed large defects in the skull, and some small holes in the mandible. Plates were taken in November, 1930. The patient was given x-ray treatment. X-rays taken in December, after two treatments, show a definite healing and filling in with bone. The exophthalmos was the greatest he had ever seen. He attempted to close the lids surgically, but gradually the strands separated and finally, ruptured

completely. Dr. Dunphy stated that Dr. Derby and he thought it advisable to have Dr. Kazanjian do some sort of plastic operation to keep the lids together, but doctors at the Childrens' Hospital thought that an attempt should be made to decompress the orbit, thinking the exophthalmos was due to filling of the orbit with yellow tumor tissue. Dr. Horrax performed a decompression operation and tried to take out tissue from behind the eye, but was unsuccessful, and the eye had to be removed.

Discussion. Dr. GEORGE S. DERBY stated that he thought attention should be called to the fact that this was only one manifestation of this disease. There was another form of it, Niemann-Pick's disease, in which the internal organs were involved. There was also a question as to whether Tay-Sachs disease had anything to do with it. A similar case was reported by Dr. John Wheeler at the American Ophthalmological Society, one by Dr. Parker Heath at the American Medical Association meeting, and one by Dr. Goldstein at the meeting of the Academy.

Toxic amblyopia in youth

Dr. EDWIN B. DUNPHY presented an Italian-American boy, thirteen years of age, who came to the hospital first in May, 1930. He gave a history of rheumatism in both knees for two months, shortly after which, vision began to fail. His vision when first seen was 20/100 in each eye, with good peripheral field, but a central scotoma in each eye for form and color. There was a history of use of tobacco and alcohol; tobacco in the form of cigarette butts, and alcohol in the form of wine which he was able to get at home. X-rays of sinuses and teeth were negative. Spinal fluid was normal; Wassermann was negative and intraocular tension normal.

Dr. Dunphy said that when he saw the case in May, 1930, he considered three possible diagnoses, namely, toxic amblyopia, Leber's disease, or retrobulbar neuritis. He said there was no history of eye trouble in any other mem-

ber of the family, and that there was a definite history of alcohol consumption to the point of intoxication and he diagnosed the case as one of toxic amblyopia.

Discussion. DR. ALLEN GREENWOOD said that the nerve head in this case showed an extreme whiteness and fluffiness that did not give him the impression that this was a true case of toxic amblyopia.

DR. GEORGE S. DERBY stated that in spite of the history which Dr. Dunphy gave of the case, it was hard for him to believe that it was toxic amblyopia in so young a child.

Cautery puncture for detached retina, two cases

DR. F. H. VERHOEFF said that the first patient was seen one week previously. There was found to be a large separation of the retina below, with a large tear at the extreme periphery of the ophthalmoscopic field below. The tear must have been at least 15 mm. long. He punctured the sclera with the actual cautery on each side of the inferior rectus muscle, and reinserted the cautery several times. Much fluid came out, and the vitreous presented in one opening. The next day the retina was completely in place as far as could be seen with the ophthalmoscope. The puncture on the nasal side did not pass through the tear, but on the other side, it was directly in it. The edge of the tear could be seen, and the retina was beginning to separate. He would be operated on again tomorrow and the outer puncture hole would show just where the tear was located.

The second patient was first seen in July, 1930. She stated that the vision of her left eye had been blurred for about two weeks. Dr. Verhoeff said that he found that she had an extensive separation of the retina outward, which reached the optic disc and involved the macula. There was a hole in the retina at about the equator, just above the external rectus tendon. He succeeded in cauterizing the hole, and the retina was completely in place the next day, and had remained there. The vision was 3/200

before the operation, and was now 20/70 plus.

Cautery puncture for detached retina

DR. GEORGE S. DERBY presented another case of separated retina. The patient was first seen at the hospital on December 23, with a vision of 4/200 in the left eye. At that time, the field of vision was very much contracted on the nasal side, and a hole in the retina directly in the horizontal meridian on the temporal side was found. The external rectus muscle had to be cut in order to reach this region, and an ignipuncture was done in the ordinary method, on December 26. The patient was kept in bed for ten days. The retina was flat, although the hole had not been struck. The vision was 20/40, and the hole could be seen. The place where the cautery went into the eye could also be seen.

Discussion. DR. ALLEN GREENWOOD stated that in these cases far better results were obtained by ignipuncture than anything done in the past. He said that we were all familiar with Dr. Vail's pessimistic report of several years ago, and would have to change our prognosis in regard to detached retina. Of course, not all cases of ignipuncture had been successful, but the percentage of good results was constantly increasing.

Localization of foreign body

DR. GEORGE S. DERBY showed a 30-year-old patient who had a wound in the outer limbus of the left eye, 3 mm. long. He had a history of foreign body from the machinery of an automobile. The doctor who attended him said he had tried the hand magnet, but without success. X-ray showed a foreign body somewhere in the region of the eye. After a careful examination, localization was done. There was a foreign body $4 \times 1 \times .5$ mm. in size, anterior to the equator just at the level of the sclera. With binocular loupe a tiny bulge on the surface of the eye ball was seen. The hand magnet was tried, and the foreign body was found projecting through the sclera in the exact spot marked on the localization chart.

Disciform degeneration of the macula, or sarcoma of the choroid

DR. F. H. VERHOEFF presented a case which showed the retina elevated in the macular region, apparently by a small mass beneath it. At the periphery, there were exudates similar to those seen in early cases of circinate retinitis. Because of these exudates, Dr. Verhoeff felt fairly certain that the case was one of disciform degeneration of the macula. The patient was being kept under close observation and if the condition was sarcoma of the choroid, this would become obvious so that enucleation could be done sufficiently early.

Sudden blindness of unknown origin

DR. HUGH DONOHUE (by invitation) reported on a man sixty-eight years of age, who was perfectly well up to six weeks ago, when he had an attack of influenza which lasted about one week. He had severe shooting pains in his head, and two days later was completely blind. The local doctor said he had irrigated his nostrils and expressed pus from them. The vision was nil in both eyes. The pupils were fixed, semidilated, and the pupil in the right eye was obliterated. There were many hemorrhages scattered throughout the retina. The retinal vessels were well marked. There were no hemorrhages in the left eye. General physical examination was negative. X-rays of skull and sinuses were negative. It was thought that possibly he might have an acute retrabulbar neuritis in both eyes.

JAMES J. REGAN,
Recorder.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

February 17, 1931

DR. S. JUDD BEACH presiding

Traumatic cataract

DR. WILLIAM S. ROWLAND presented a bricklayer, thirty-three years of age, seen first on October 4, 1929, giving the following history: while lying on his back, working under his automobile the evening before, a wrench slipped from

his hand, falling upon his face, breaking the left lens of his spectacles, and striking the left eye. His family physician removed several pieces of glass shortly after the accident, instilled mercuriochrome, and covered the eye with a sterile dressing.

The following morning, the left eye showed swollen lids and slight ciliary injection. There was a fine linear corneal laceration running vertically, about 8 mm. in length, situated at the left pupillary margin. The lips of the wound were exactly coapted. The anterior chamber was almost obliterated. Tension was about $-1\frac{1}{2}$ by fingers. The pupil measured 3.5 mm. and was filled with gray lens substance. There was a vertical tear in the anterior lens capsule, coinciding with that part of the corneal wound immediately overlying. The iris was not incised.

There was no evidence of infection in the eye at any time, and the treatment consisted of atropin and dionin. One week later, lens substance began to erupt through the capsule tear. The patient was seen at intervals of one week. The center of the lens cleared first, and later the periphery, indicating little nuclear sclerosis. The last part of the lens to be absorbed was the upper nasal quadrant. The eye remained slightly injected until absorption was complete. Ten and one-half months later, the eye was practically clear and lens absorbed. The fundus could be clearly seen and, with a correcting lens, vision could be brought to 20/30.

Dr. Rowland stated that the patient exhibited several points of interest; first, he was wearing myopic correction at the time of the accident which accounted for the wound being centrally located. Records would undoubtedly show more injuries to eyes following breaking of myopic than hyperopic lenses. The absorption of the lens in this case was as satisfactory as any surgically attempted.

The problem of refraction which now presented a myopic right eye and an aphakic hyperopic left eye, was handled in the following manner: O.D. -2.50 Sph. -3.00 cyl. ax. 10 vision =

20/20 and Jaeger 1. O.S. + 3.00 Sph. + 3.00 cyl. ax. 1.50.

This prescription gave somewhat equally balanced lenses from the standpoint of weight in the frame, improved the vision in the left eye and, at the same time, did not render conspicuous the size of the patient's eyes.

Exophthalmos, venous congestion, and glaucoma

DR. EDWIN B. DUNPHY presented a man, sixty years of age, seen at the Massachusetts Eye and Ear Infirmary in December, 1930. He gave the following history: pain and tenderness in the right eye, with headaches four months ago (symptoms cleared up in four days); gradually increasing swelling of the right eye lid; during past two weeks, failing vision in the right eye.

Examination at that time showed exophthalmos of the right eye, vision reduced to light perception. Right pupil was smaller than left and grayish-green in color. Fundus could not be seen. The eyeball was fixed. There was complete anesthesia of right cornea and conjunctiva, and relative hypoesthesia over the first and the second divisions of the right trigeminal nerve. The left eye was normal. There was no bruit heard in the region of the right orbit. Systolic blood pressure was 160. There was no marked arteriosclerosis. The patient was given saturated solution of potassium iodide, ten drops three times a day, and the exophthalmos disappeared almost completely within two weeks. When last seen, the patient showed no exophthalmos, but vision remained nil.

Exophthalmos and papilledema

DR. H. B. C. RIEMER presented a man, aged thirty-three years, an executive in a shoe factory, who noticed blurred vision in the left eye, while playing golf. Upon examination, one week later, October 22, 1930, vision O.D. was 20/15; O.S. 20/32, with plus 5.00 D.Sph. was 20/25. Right eye was normal. Left eye showed exophthalmos and papilledema. The upper inner mar-

gin of the optic disc was blurred and fringe-like. There was no limitation of motion; no pain on pressure. Form field was normal; blind spot enlarged. The condition was essentially the same one week later.

December 5, vision O.D. was 20/15; O.S. 20/50, not improved by lenses. Exophthalmos measured 4 mm. No limitation of motion was present. There was no change in appearance of optic disc. On December 17, the patient was presented at the Ophthalmology conference at the Massachusetts General Hospital. At that time, vision was 20/15 in the right eye and 20/40 in the left. Form field was normal. There was enlargement of the blind spot. Central scotoma for all colors with Haitz' charts. Exophthalmos was 4 mm. Consensus of opinion at conference was that patient's interests would best be served by awaiting developments. January 7, 1931, left eye showed no change in exophthalmos or papilledema. X-ray by Dr. A. S. MacMillan showed skull negative, orbit negative, sinuses negative, both optic canals normal in size and shape. Spinal fluid was negative. Blood Wassermann was negative. Examination for lead was negative. January 23, vision O.D. was 20/15; O.S. fingers at two feet, not improved. Pupil, left eye moderately dilated; did not react to direct light, but had good consensual reaction. Exophthalmos and papilledema were unchanged. February 4, vision O.D. was 20/15; O.S. light perception. Exophthalmos and papilledema unchanged. Ophthalmology group again advised to wait further developments. February 9, left eye optic disc blurred; fringe-like border upper nasal quadrant; veins slightly dilated; exophthalmos 4 mm.

Dr. Riemer said the following three conditions might be considered in this case: orbital tumor; tumor of optic nerve; retrobulbar neuritis.

Orbital tumor was suggested by the exophthalmos, but the failure of the exophthalmos to increase, as well as the negative x-ray finding, was sufficient to eliminate this as a cause.

He said that loss of vision in optic nerve tumor was often more sudden and complete than in this case, and the exophthalmos should also have increased in four months. Retrobulbar neuritis could not be ruled out. The chief argument against it was the exophthalmos, and perhaps, the small loss of vision. The patient was not certain that the left eye had not always been slightly more prominent than the other. Dr. Riemer saw an old photograph taken many years ago in which it appeared that the left eye was more prominent than the right. If the exophthalmos had always existed, he said, the diagnosis of retrobulbar neuritis seemed the most likely, and this probably was an early manifestation of multiple sclerosis.

Note. Dr. Riemer's patient was seen by a consultant in another city who thought there existed some sort of orbital tumor. A Kroenlein operation was done by Dr. Victor Kazanjian and Dr. Hugo B. C. Riemer in March, 1931, at which time, the orbit was well exposed and carefully explored. There was no sign of tumor of orbit or optic nerve. A section of the optic nerve was removed at the suggestion of Dr. Verhoeff who stated that frequently he saw nerves which looked normal but were not.

Dr. Verhoeff reported that the specimen excised showed no tumor. Vision in the left eye was nil. The exophthalmos persisted and Dr. Riemer's diagnosis of retrobulbar neuritis seemed corroborated.

Slit-lamp progress in ophthalmology

DR. J. HERBERT WAITE read a paper on this subject and, after giving a brief résumé of the development of focal illumination up to its acme in the slit-lamp principle as adapted by Gullstrand, he reviewed the work of Vogt and others in applying slit-lamp microscopy to the study of clinical problems. The lack of uniform terminology in this field was mentioned, and the need for careful interpretation and verification of findings was advocated. Abnormal conditions in cornea, aque-

ous, iris, lens and vitreous, in recognition of which slit-lamp microscopy was particularly helpful, were illustrated with numerous epidiasepic projections.

JAMES J. REGAN,
Recorder.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section of Ophthalmology

January 15, 1931

DR. H. MAXWELL LANGDON, president

Glass ball implant of thirty-four years duration

DR. GEORGE H. CROSS reported the case of a man, aged fifty-four years, who had been referred for the purpose of reconstruction of his left socket, which was so shrunken and cicatrized that it was no longer possible to wear an artificial eye.

At examination there was found a solid object, deep in the orbit. Upon questioning, the patient stated that 34 years before, following the loss of his eye, a Mule's operation had been performed. In order to enlarge the socket at this time, an incision was made through the tissues of the orbit and a hollow glass sphere about 13 mm. in diameter was removed. Strangely, this sphere was filled with a slightly turbid bloody fluid which had evidently seeped through a pin hole opening. Where the fluid came from was an unsolved problem.

During the 34 years this glass ball was in situ there had been gradual absorption of the glass, leaving a very thin spot which had evidently broken through. It was thought, because of the length of time, this would be of interest to the Section, especially so on account of the newer operations used in enucleation.

Penetrating wound of lid and eyeball

DR. FREDERICK KRAUSS presented the case of a patient who was struck with a large piece of glass from an exploding root beer bottle which he had placed near a stove. The cut extended

nearly the whole length of the lower lid. The cut in the eyeball began about 5 mm. below the ciliary body at about six o'clock and extended about 12 mm. down and back. The eyeball was very soft. The vision was nil. The vitreous was filled with blood, therefore, no view of the eyeground was obtainable though the anterior media remained clear. After suturing the wounds the patient was put to rest and given atropine and a solution of metaphen for antisepsis. After ten days the vitreous began to clear. A Vossius ring was present. A broad white tear could be seen in the periphery of the retina extending halfway to the macula, but lateral to it. The retinal edges of the cut were blood stained throughout. The vitreous had cleared except for a dense organized mass below and very far anterior. The cut in the retina had apparently healed and was seen with difficulty. The field of vision was but slightly involved. The central vision with correcting lens was 20/30. Externally there was a somewhat depressed pigmented scar in the sclera at the site of the injury. The Vossius ring though less marked, had persisted.

Discussion. DR. ZENTMAYER asked whether the Vossius ring had been examined with the biomicroscope for the purpose of determining whether the lesion was pigment or blood, a question which was still in dispute. Some years before while doing an advancement operation, as he placed one of the scleral sutures he was conscious of the sudden change in resistance and thought the needle had probably penetrated through the sclera. Shortly afterward a line of blood appeared on the anterior surface of the iris, just sufficient to obscure vision. Two days after the operation he examined the eye with the ophthalmoscope and found that the patient had a typical Vossius ring cataract. Dr. Holloway confirmed the diagnosis.

This patient had been under observation for some time in the clinic and had been tested for glasses several times, and the media had always been noted as clear.

Dr. Zentmayer further stated that Hesse endeavored to produce a Vossius ring cataract by injecting a small amount of blood into the anterior chamber but because of the rapid coagulation of the blood, he was successful in only one instance. After learning of Dr. Zentmayer's experience, Finnoff undertook to cause experimentally this lesion by producing intraocular hemorrhage. He produced in one case, a partial ring. He expressed the belief however that rabbits were not altogether suitable for the experiment.

DR. KRAUSS said that the anterior chamber had always been free of blood. He had examined it under the slit-lamp and there were many fine punctate opacities which he had interpreted as being pigment rather than blood. However, he said he was not the expert that Dr. Zentmayer was with the slit-lamp and that he would be very glad to have him study the case further if he cared to do so, but his impression was that it was pigment.

Homonymous hemianopsia in diabetes

DR. DE SCHWEINITZ reported briefly the case histories of five patients with diabetes; two men and three women, having homonymous lateral hemianopsia. He referred to eighteen other cases in the literature, and especially to those collected by Wilbrand and Saenger.

He pointed out that this field defect was not due directly to the diabetes, but was caused by vascular lesions in the occipital lobes. The hemianopsia, right or left lateral, might be at once complete; might begin as a quadrant defect followed later by loss of the homonymous lateral fields, or with scotomata which subsequently expanded into complete hemianopsia; or lateral homonymous scotomata remaining unchanged.

In one case reported by Wilbrand, the field defect presented itself in the form of the so-called macular hemianopsia. Occasionally the hemianopic fault entirely disappeared; usually it was permanent. It might be detectable only if the field was tested under re-

duced illumination, especially if partial cataract was present. The hemianopsia might be the only symptom of the brain lesion, or might be followed by others, for instance, hemiplegia. In all cases that had come to autopsy, as reported in the literature, the lesions were vascular (hemorrhagic) in character.

Discussion. DR. HOLLOWAY stated that it was quite true that hemianopsia associated with diabetes was not mentioned in connection with this affection in many of the treatises on this subject. He had seen but two cases. He felt, as he knew was the case with Dr. de Schweinitz, that the condition was doubtless the result of vascular changes so frequently seen in connection with this disease.

Cysts of the orbit

DR. FREDERICK KRAUSS presented the history of two cases of cyst of the orbit. The first case was in a seventy-year-old woman who had a dense tumor in the upper inner angle of the orbit, slow in growth and associated with no pain. Careful palpation indicated a soft center in the tumor. The x-rays were negative. Nasal symptoms were absent. Upon dissection, the tumor was found to be filled with very thick mucoid substance, the culture of which showed staphylococci only. A second collection of the same material was found in the deeper ethmoidal cells when the curette was carried through a small carious opening in the os planum. The periosteum had been elevated by the secretion to make a cavity extending to near the optic nerve entrance. Rapid healing occurred after a large opening had been made into the nose with primary closure of the wound.

In the second case, the tumor was associated with edema of the lids and considerable proptosis of the left eye ball. The x-ray disclosed disease of the frontal, ethmoidal and antral sinuses of that side. The middle turbinate did not appear diseased, but the outer nasal wall was slightly edematous and pressing against the turbinate. An intranasal operation was performed with the

evacuation of large quantities of offensive pus from the ethmofrontal region. A complete exenteration of the ethmoids was performed with washing of the antrum, which also contained offensive muco-pus. The external operation was not performed as the condition improved with complete disappearance of the exophthalmos.

The treatment of interstitial keratitis

DR. JOSEPH V. KLAUDER and (by invitation) DR. HAROLD F. ROBERTSON presented an analysis of 105 case records of interstitial keratitis with reference to the following data: Age of patient: up to five years, six patients; six to ten years, 24; 11 to 15 years, 29; 16 to 20 years, 21; 21 to 25 years, 15; 26 to 30 years, 8; 31 to 35 years, one; 35 to 40 years, one. Total, females 63; males 42.

The absence or presence of the major stigmata of congenital syphilis concerned: fasies: present in 39; absent in 37; suggestive in six; no mention in 23. Teeth: Hutchinson in 16; abnormal in 35; negative in 54. Deafness: present in four; absent in 101. Sabre tibia: present in 20; suspicious in six; absent in 62; no mention in 17. Clutton's joints: present in 18; suspicious in nine; absent in 78. Wassermann and Meinicke reaction: positive in all but four.

From the foregoing it could be seen that about one-third and less of the entire series presented objective evidence of congenital syphilis, whereas all but four patients presented positive Wassermann reactions. Of these four, in two the Meinicke was positive.

Involvement of eyes: both eyes showed active involvement in 35; unilateral involvement in 37; inactive in 33. Period of observation: about one-third of the patients attended the clinic for about six months; one-third for about one year; and one-third from one year to 34 months. Results of treatment: of 37 patients with an initial attack of interstitial keratitis in one eye, there was an involvement of the second eye in ten. In three of these, however, this involvement occurred after very little treatment, then a lapse

of all treatment, owing to lack of attendance. In five, after moderate treatment, then a lapse of all treatment. In two, involvement of the second eye occurred after thorough treatment. In the entire series, recurrences occurred in one or both eyes in three patients after moderate amount of treatment.

Treatment: drugs employed included neoarsphenamine, sulpharsphenamine (intramuscularly and intravenously), tryparsamide; unctions of mercury, iodides (orally and intravenously), bismuth (intravenously and intramuscularly), bismarsen (arsenical bismuth preparation). One or more of these drugs were used in different patients in order to determine the most effective means in treatment of interstitial keratitis. Of the foregoing drugs, bismuth therapy appeared to yield more favorable results than any other. Moreover, bismuth was much less toxic than mercury or arsenic. It was well tolerated by children and its administration was much more practical than that of the arsenicals.

The importance of early diagnosis and early treatment were emphasized. It was advocated that an injection of bismuth be given the first day the patient was seen, even though the diagnosis was not definitely established, since such injection was harmless.

The more favorable formula of treatment appeared to be a weekly injection of bismuth intravenously (10 mgm. of colloidal bismuth), a weekly injection of bismuth intramuscularly, and from 15 to 25 grains (depending on the age) of sodium iodid. The dosage of bismuth for intramuscular injections advised at different ages was as follows: 25 mgm. of the metal bismuth, up to the age of five; 50 mgm., from five to six; 75 mgm., from six to seven and a half; 100 mgm., from seven and a half to ten; 150 mgm., from ten to 14; 200 mgm., over 14.

Lantern slides were used, showing the evolution of interstitial keratitis, with and without treatment, and unusual features of the disease.

The phenomenon of the involvement of the other eye was discussed. It was

pointed out that such involvement while the patient was receiving treatment, was unique in the entire field of syphilology. There was only one other clinical circumstance and that was rare, in which a comparable process occurred. That was the occurrence of cutaneous syphilides while antisyphilitic therapy was being administered. In these circumstances the administration of another antisyphilitic drug (changing from an arsenical to mercury or bismuth) invariably caused the involution of the cutaneous syphilide.

The rôle of anaphylaxis as a cause of sensitization of the uninvolved eye was discussed.

The possibility of antisyphilitic drugs not reaching the cornea was also discussed. Recent studies by others, however, showed that some drugs did reach the cornea. Experimental studies were conducted to determine if antisyphilitic drugs injected into rabbits reached the cornea.

Syphilis was visualized as an infection from a clinical and laboratory viewpoint. It was pointed out that the mechanism of immunity in syphilis was largely a tissue reaction rather than humoral. In experimental rabbit syphilis, the incidence of eye lesions could be varied by using experimental means to vary general tissue reactions. It appeared from the foregoing visualization that the cornea responded feebly to a syphilitic process.

Unsuspected brawny scleritis in a case of retinal detachment with secondary glaucoma

DR. T. B. HOLLOWAY and (by invitation) DR. W. E. FRY, reported the history of a man, aged forty-nine years, who had been having exacerbations of pain and redness of the left eye, extending over a period of six months. There was no history of injuries or previous inflammatory attacks. The blood Wassermann was positive. The vision of the right eye was 5/5 and of the left, light perception.

Right eye was negative. The pupil of the left eye was dilated and fixed. There was a diffuse bulbar injection

with marked over-filling of the episcleral vessels. The cornea was clear; anterior chamber shallow. By oblique illumination one could readily discern an enormous detachment of the retina. By transillumination a questionable shadow was obtained centrally in the pupillary area, but it was not regarded as being dependent upon a growth. With Schiötz tonometer the tension of the right eye was 16 mm., of the left 33 mm.

Microscopic examination showed the characteristic findings of brawny scleritis. Dr. Verhoeff was good enough to examine the sections and reported that he believed the condition to be as above described.

In closing, Dr. Holloway stated that this patient had been sent to his office for consultation and that with the scant light perception, the detachment of the retina and secondary glaucoma, he felt there was but one decision to make, and that despite the fact that no definite shadow, dependent upon a probable growth, was present. He stated that a brawny scleritis was not even thought of at the time the patient was seen, and that the eye did not manifest any evidences of the clinical findings usually associated with this affection. He said that the literature showed several instances where the condition was unsuspected and the diagnosis had been made after enucleation.

A. G. FEWELL,
Secretary.

CLEVELAND OPHTHALMOLOGICAL CLUB

February 10, 1931

Dr. W. E. BRUNER presiding

Simulation of blindness

Dr. ELLICE M. ALGER said that hysteria must essentially be the same disease that it was in the time of Hippocrates, but its symptomatology had become quite different. If one was to mimic disease he must do it according to his personal conception of disease, which had changed and become more com-

plex with every passing generation. The individual's own intelligence and type of education made a vast difference in his interpretation, for instance, the amblyopia of a hysterical ophthalmologist would be a much more complex performance than that of the layman. The average hysterical patient whose ideas of physiology and functions were rudimentary always presented features that were absolutely inconsistent with anatomy and physiology. Ridiculous and impossible as his symptoms might be they were actual to the sufferer. He prevented impressions from rising into his conscious mind by what Janet called a "retraction of consciousness", though they did enter the subconscious. For example, he might feel a touch and yet be unconscious of the sensation.

Hysterical ptosis was spastic and not paralytic. Spasm of accommodation with myopia and miosis was seen but never paralysis of accommodation and mydriasis. To be sure these could be simulated by refusal to accommodate, and spastic mydriasis could be caused indirectly through emotions, but the pupil in hysteria always reacted to light unless there was other pathology. Just as we could stimulate salivary secretion by thinking of food so the hysteric might cause nausea and vomiting, or change his pulse rate.

The hysterical patient often complained of diplopia. Sometimes it was binocular but very often monocular and not infrequently it was a monocular polyopia. He also claimed macropsia or micropsia. His central vision in one eye might be greatly reduced yet it was often possible to show, with little effort, that in binocular vision the eye saw as well as its fellow. Just as he had cutaneous and corneal anesthesia, so he had a sort of retinal anesthesia as well. He refused to notice retinal stimuli and his fields were concentrically contracted almost to the fixation point, yet his pupils reacted sharply to the light he could not see. The contracted fields also were probably governed by his own conception of the physiology of sight. Ignorant of the

distinction between central and peripheral vision, autosuggestion dictated that both should fail together. Not knowing that white included all colors it seemed perfectly consistent to him that the color field should be as large as the white. He knew nothing about the crossing of nerve fibers and therefore simulated monocular blindness but unless specially trained, never hemianopsia. We based our diagnosis of hysteria not on any one symptom, but on the incongruity of the whole clinical picture. The sudden onset without obvious cause, the cutaneous and corneal anesthesia, the contracted fields, and especially on the rapid variability of symptoms and the marked suggestibility of the patient. As ophthalmologists, we were primarily interested, not in the nature of hysteria, but in its ocular symptoms, and not because they were symptoms of hysteria but because they might occur in other much more emergent diseases.

In hysteria the patient deceived himself first of all, from motives which seemed to him sufficient and perhaps noble. The malingerer, on the other hand, had no illusions, as he might deceive others with conspicuous success, but never himself. Incentive for malingering had been greatly accentuated by various forms of insurance, causing the individual to take advantage of the most trivial injury and prolong his convalescence. The situation was further complicated by the fact that there was no penalty for malingering. Success might yield great rewards while failure only stimulated an endeavor for better technique.

On the other hand few patients would claim loss of vision without some logical basis, possibly employment under circumstances endangering their sight or an actual injury previously sustained. There were many slight injuries which, because of their location, interfered seriously with vision, such as central corneal scars, minute macular hemorrhages. Furthermore there were patients with no demonstrable lesions, who had undoubted amblyopia. Therefore evidence, showing that

the patient had an old trachoma, or syphilis, arteriosclerosis or an old strabismus, might be most important. The mere assertion that in your opinion the claimant was a malingerer was not sufficient, as a jury or even a compensation commission was rightly very suspicious of expert testimony. One must, if possible, offer evidence not of what he ought to have seen but of what he actually did see during the examination. For this reason the various diplopia tests had but limited value.

The usual routine objective examination, made with apparent carelessness would show any gross lesions present. The involuntary binocular fixation instinct might prove valuable. If a prism was held over the good eye it moved toward the apex of the prism in fixing, and the fellow eye, if blind, would move in the same direction, while if seeing it would maintain its position until the prism became too strong.

Most people who were in the habit of using both eyes together, were totally unconscious of the part played by each. Their binocular vision was practically unchanged when one eye had its vision reduced by drugs or lenses, and they did not know which eye was doing the actual work so long as both were open. This was the foundation of all successful acuity tests with malingerers. If we could put over the good eye lenses which admitted the light and give the impression that this eye was being used, yet reduced its acuity materially, the binocular vision registered must be the vision in the other eye.

Both hysteria and malingering responded to the same type of tests, and detection was but a contest of wits between physician and patient for which the simple test with ordinary office equipment was sufficient. However, if we failed to prove exact vision we must abandon our efforts for the time being, and be satisfied with proving bad faith.

Discussion. DR. R. B. METZ had a patient who was struck on the cheek with a heavy rope, and as a result claimed total loss of vision. It seemed rather unreasonable, as although the blow was fairly severe the patient's eyes

were deepset and showed no signs of injury. Upon examination he claimed to see only hand movements at one foot. However, it was found that he had about ten diopters of myopia in each eye and with the proper correction was able to read Jaeger No. 1. In another case he was successful in detecting malingering with the use of an amblyoscope which so confused the patient that he did not know whether his good or bad eye was being examined.

DR. P. G. MOORE said that he generally went through his routine examination, demonstrating no suspicion, observing the patient and gaining his confidence. Just before dismissing the case, and after drawing his own conclusions he suddenly switched back to the preliminary and caught the patient totally off guard.

DR. W. E. BRUNER said that in a recent industrial case, being positive that the patient was malingering, he had detected this by the use of a stereoscope.

As examiner in the aviation unit during the War, he had always insisted on the soldier coming into his office for examination. Endeavoring to escape service, some of them became suddenly so blind that it was a miracle how they ever found their way in.

DR. R. F. THAW said that the most successful method he had found in the case of malingerers was the read and green glass test, as one could not only tell whether the patient had vision but also the amount. The only difficulty was getting charts at about a distance of 20 feet, as there was either a faint outline of the red letters with the green, or an outline of the green letters with the red glass. This method was more successful in reading near charts. A standardized chart, easily read, was best for this work as it did not arouse the patient's suspicion.

DR. M. P. MORRO commented on a patient seen about a year ago who had been hit on the right side of the head. The right eye showed no effects of trauma, and he was able to obtain fairly good vision. He diagnosed the case as traumatic neurosis and was greatly surprised to see the patient

eight months later with a definite optic atrophy.

Another case, under the care of Professor Van Szily, claimed loss of vision following a factory accident. An apparent lameness also developed necessitating a cane for aid in walking. The only ocular abnormality was unilateral pin point pupil that shifted from eye to eye in repeated examinations. A bottle of eserine was found in the cane.

DR. E. M. ALGER said, regarding an outline of the red letters through a green glass, this was because the type was pressed on so hard that there was light reflex interference. This could be remedied by rubbing down the surface to remove the gloss. Also in choosing the type of glasses used for these tests, adapt the glass to harmonize best with the conditions under which you tested cases of this nature to obtain the best results. M. PAUL MORRO, Secretary.

BROOKLYN OPHTHALMOLOGICAL SOCIETY

February 19, 1931

DR. JOHN N. EVANS presiding
Pulsating exophthalmos

DR. EDWARD GRESSER presented J. Z., male, aged fifty-six years, first seen on November 8, 1924, one month after onset of symptoms. There was slight pain in the left eye, diplopia, and slight proptosis. The left eye was fixed for movement, the vision was good and the eye essentially negative except for moderate chemosis.

A retrobulbar tumor was suspected and confirmed by x-ray. Before the positive Wassermann test was received x-ray therapy was instituted; but without any appreciable effect. Antiluetic therapy caused a rapid subsidence of the condition, which was then diagnosed as orbital gumma. Eventually primary optic atrophy resulted.

A little less than a year later, the patient returned with pulsating exophthalmos of the right eye. No history of trauma was given nor other adequate history. The clinical picture was classi-

cal. Ligation of the right common carotoid artery was performed, with subsequent subsidence of the proptosis and diminution of the head noises.

The present status revealed a total ophthalmoplegia of the left eye, in addition to a primary optic atrophy. The right side showed a sixth nerve paralysis, an immature cataract, a nerve head that was partially edematous and some retinal hemorrhages.

Maitre Jan

DR. DAVID BISHOP read a description of the preparation of the patient for cataract operation and of the operation itself, translated from the French of Antoine Maitre Jan's "Treatise on the Diseases of the eye and the proper remedies for the cure," published in Paris in 1722.

MAITRE JAN had been called the father of French ophthalmology. His chief claim to fame rested upon his rediscovery, in 1682, of the true nature of cataract, which led eventually to the abandonment of the couching operation and the development of the operation of extraction.

The doctrines of the real nature of cataract had been announced some thirty or forty years previously by Quarré and its truth demonstrated by a German, Rolfink, by anatomical investigation, but in the intervening years it had been completely forgotten.

At the time of the rediscovery by Maitre Jan that cataract was an opaque lens, the general belief was that the lens was situated much more deeply in the eye than it is, and that the cataract was an effusion between the pupil and the lens, which, by coagulation, produced the opacity.

GEORGE FREIMAN,
Associate Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY

March 21, 1931

DR. W. A. SEDWICK presiding
Detachment of the retina

DR. H. L. LUCIC presented a Filipino, twenty-two years of age, who was first

seen in June, 1928, at which time he complained of black specks in front of his left eye. The vision was 20/20. A hurried examination of the fundus revealed two linear streaks above the macula. He was instructed to return in a few days but failed to do so for two years.

On March 11, 1931, the patient returned. The vision had gradually become worse since 1928. With the left eye he counted fingers at about 12 inches. There was an extensive detachment of the retina involving the entire lower half. Transillumination was unsatisfactory. Tension was 22 mm. Schiötz in each eye. The case was presented as to the possibility of intraocular tumor.

Discussion. DR. W. A. SEDWICK felt that the detached retina was so undulating that it pointed against the presence of tumor.

DR. W. C. FINNOFF said that transillumination had been unavailing in this case for him because of the deep pigmentation. He would be inclined to watch the tension and if it went up he would enucleate.

DR. P. THYGESON said that he had recently seen a case where the tension had been 8 mm. and later the eye had become mushy and yet the eye contained a tumor when enucleated.

DR. G. L. STRADER mentioned a case in which six months after an apparently simple detachment a sarcoma was found breaking through near the limbus. The patient died of sarcoma of the spleen.

DR. W. M. BANE suggested the removal of the subretinal fluid to see whether the retina would replace temporarily.

Sympathetic ophthalmia

DR. H. L. LUCIC also presented R. S., a girl eight years old. She had been struck in the left eye by a piece of wire in August, 1929. The family physician had treated the injury for about 18 months. An oculist had been consulted at that time who had advised enucleation.

The patient was seen by Dr. Lucic on February 2, 1931, at which time the following observations were made: left eye ball slightly congested and soft. The pupil was completely obliterated and displaced down and out. There was a small corneal scar in the lower outer quadrant. There was no light perception. Right eye showed slight circumcorneal congestion, pupil moderately dilated and fixed, iris congested and hazy, anterior capsule studded with large specks of exudate and similar but smaller deposits on Descemet's membrane. The fundus was not visible. Vision was 20/100.

The left eye was enucleated the same day. Foreign protein was given intramuscularly, salicylates by mouth and the usual local treatment for iridocyclitis. Under such treatment for seven days the vision improved to 20/30. The patient was allowed to go home within ten days with instructions to use atropin and to return in a week. At the end of the week this eye was definitely worse. The pupillary region was thickly studded with masses of exudate and the vision was reduced to 20/70. The patient was placed on salicylates and was given a subconjunctival injection of a solution of 2 percent dionin in 1:5000 mercuric cyanide. This was followed by immediate improvement. This injection was repeated once a week for three weeks at the end of which period the vision improved to 20/30.

Discussion. DR. W. C. BANE believed the eye was now fairly safe from resumption of the process although such an eye was lacking in the normal resistance to many other sources of irritation.

DR. W. C. FINNOFF called attention to the boy whom he had had before the society several years ago. He said that this boy's eyes had flared up several times, especially when he had a cold and that even now there were some unpigmented deposits on the endothelium. Dr. Finnoff and Dr. Sedwick suggested that Dr. Lucic's patient should have a course of sodium salicylate and inunctions of mercury at intervals.

DR. C. E. SIDWELL stressed the value

of hygienic measures, a tonic and elimination of foci of infection.

DR. W. M. BANE mentioned the differential blood count as a means of diagnosis of sympathetic ophthalmia.

Dr. Lucic closed by saying that the patient had had mercury and was now getting salicylates.

Retinal hemorrhages

DR. W. C. FINNOFF presented Mr. A. M., aged forty-six years, who had complained of symptoms of presbyopia. The vision of the right eye was 20/15 and of the left 20/15 minus. The right fundus was normal.

In the left eye there was a moderate hemorrhage in the nerve fiber layer of the retina, at the upper nasal portion of the macula, in the region of the first large lower branch of the upper temporal vein. The hemorrhage did not interfere in the least with the vision. The vessels were good and no other retinal anomalies were present in the fundus. Blood pressure was 115/70.

The specific gravity of the urine was 1.020. There was no albumin nor sugar. Two small granular casts were on the slide which was otherwise negative. The white cell count was 5,000 and hemoglobin 65 percent. A differential count was normal.

There was no history of recent illness of any type. The only cause for the hemorrhage that could be found was simple anemia.

Extensive tears in the retina from trauma

DR. W. C. FINNOFF also presented H. J., aged twenty-three years, a colored pugilist, seen December 12, 1930, at which time he gave a history of sudden loss of vision in the right eye ten days previously. He was myopic.

On examination a posterior polar opacity was present in each lens, the vitreous of each eye contained several floating opacities. In the right eye an extensive detachment of the retina was present with a very large tear between eight o'clock and eleven o'clock; on the temporal side a second tear was seen

between one and three o'clock, and a third between four and six o'clock. On the temporal side the frayed edges of the retina were clearly visible with the ophthalmoscope. Two Gonin cautery punctures were made, one in the upper temporal quadrant and the second in the lower nasal quadrant of the eye just behind the region of the ora serrata. The retina flattened down for a few days and remained fixed in the upper temporal region for four days, and then detached a second time. The case was shown because of the very extensive tears.

Discussion. DR. W. M. BANE mentioned a case of detached retina of two months standing in which no tear could be found. He withdrew some subretinal fluid with a needle. The patient reported in a week with a definite reduction in the elevation and with better vision. Two weeks later he withdrew some more fluid. Dr. Bane was of the opinion that this procedure was more rational than the ignipuncture of Gonin when no tear was found.

DR. V. H. BROBECK reported having seen Lindner do twelve Gonin punctures. Dr. Brobeck said it was the feeling in Vienna that the prognosis for cure was poor unless the tear could be located and cauterized. A complicated Gullstrand apparatus was used in locating the hole and a protractor was sewed around the cornea at the time of the operation. Guist had said that he had operated on 112 cases, with improvement in 80 percent. Dr. Brobeck asked as to the method of localization that Dr. Finnoff had used.

DR. W. H. CRISP said that the Gullstrand apparatus was of least value in locating tears near the ora serrata. He quoted Gonin as having said that he had obtained results where he could find no tear. Dr. Crisp asked whether anyone had noted any change in the refraction following the ignipuncture. He had had one case in which 4 D. of myopia had disappeared. In one case the refraction had changed in the same direction. If such changes were constant might this not be the germ of an idea in treating myopia?

DR. G. STINE said that he had recently seen a patient that had a history of cure of detachment after eleven months in bed. Dr. Stine could find no evidence of the alleged detachment.

Traumatic ophthalmoplegia and blindness

DR. G. L. STRADER presented Mr. D., a man of seventy-two years, who on February 28, 1931, had tripped over a wire and had fallen full length to the ground. His face landed in a bunch of shrubs which had been trimmed down last fall to the height of ten or twelve inches. Apparently one of these shrubs penetrated the left orbit through the lower lid. He was treated by his family physician who sutured the wound in the lower lid.

On March 6, examination of the right eye showed the nerve head swollen and vessels very tortuous. Fresh small retinal hemorrhages were scattered over the fundus. Vision was 20/200. The lids of the left eye were swollen with complete ptosis of the upper lid. There was a healed skin wound at the lower orbital margin. The conjunctiva was chemotic and protruding through the palpebral fissure. The eye ball was proptosed and fixed in a central position. The pupil was widely dilated and inactive. X-ray examination was negative. Vision was nil. At present there was beginning temporal atrophy of the nerve head and very slight motion of the eyeball inward. Otherwise the condition of eye was unchanged.

Discussion. DR. W. H. CRISP and DR. D. C. STRICKLER suggested an independent lesion of the brain.

DR. EDWARD JACKSON said that it would be peculiar to have such a paralysis from any lesion of the brain. He believed that the picture could be produced by an injury to the nerves as they entered the orbit. The beginning atrophy pointed to an injury of the optic nerve.

DR. H. L. LUCIC did not believe that any lesion of the brain would account for the total ophthalmoplegia.

DR. W. C. FINNOFF suggested that the

muscles might have been pulled from their attachments around the optic foramen and that the optic nerve had been injured because of its proximity to the insertions.

Recurrent pterygium

DR. G. L. STRADER also presented Mr. K. machinist, aged fifty-five years, who had been seen in August, 1929. He complained that something had been growing on the left eye for a year or two.

He had a broad fleshy pterygium extending over the cornea about 3 mm. This was removed by the McReynold's method. The growth recurred rather rapidly. A second operation was done in December, 1929, with similar results. In June, 1930, he went to Omaha where a third operation was done. Within a month there was a recurrence. The growth was very thick and exceedingly vascular, having much the same appearance as a rapidly growing epithelioma. The cornea above and below the apex of the growth showed a rich plexus of blood vessels. The apex of the pterygium was again carefully shaved from the cornea and, together with an area of the hypertrophied conjunctiva 7 mm. wide, was removed. The conjunctiva above and below was dissected loose. The two edges were brought together in the median line and sutured. A triangular area next to the cornea was covered with a Thiersch graft.

The Thiersch graft had slipped under the dressing so that the white area was further over the cornea than desirable. There had been very little irritation of the eye for several months, but the eye was not quiet. Dr. Strader said that he would have used a lip graft, except that at the time he felt he was dealing with an epithelioma.

A general pathologist sectioned the conjunctiva that was removed and pronounced it non-malignant. A section was examined by an eye pathologist who reported evidence of beginning epithelioma.

Discussion. DR. W. C. BANE said that he had never had a recurrence with a McReynold's operation. He believed

that radium application was the procedure of choice in treating epitheliomas.

DR. J. A. McCaw believed that Dr. Bane's case and his case had had an epitheliomatous degeneration of pterygium, and that radium had cured them.

DR. GEORGE STINE suggested the use of the thermophore.

DR. W. A. SEDWICK said that he believed that recurrences were due to tissue proliferation in the sulcus at the limbus, and that it was his custom to apply carbolic acid there at the time of the operation.

DR. STRADER, in closing, stated that he had had several recurrences with the McReynold's method.

Intraocular foreign body

DR. V. H. BROBECK reported the case of J. C., aged twelve years. One month ago he was struck in the left eye with something when he hit a nail on a block of concrete. He was treated by an osteopath with a collyrium and the eye apparently recovered.

He came to Dr. Brobeck several days later complaining of loss of vision in the left eye. He could see hand movements in the upper and lower nasal field. There was no pain, but faint pericorneal congestion was evident. The lens was clear, but the vitreous was so turbid that the fundus could not be seen.

The vitreous was especially cloudy in the central portion. On the nasal side of the fundus about two disc diameters back of the ora serrata, a rectangular shaped, gleaming substance was seen moving slightly with the rotation of the eye ball. An area resembling a proliferating retinitis was also seen, as well as two similar areas in the posterior pole. However, these were poorly seen.

There was a small scar in the sclera 3 mm. from the inner canthus in the horizontal meridian of the globe.

After x-ray examination with Sweet's localization, a foreign body 9 mm. behind the center of the cornea and 1 mm. above its horizontal plane was reported.

The next day the patient confessed that his injury occurred after hitting a

.22 cartridge in a vise. The lead remained in the vise and it was concluded that the foreign body in the vitreous was a piece of the copper shell.

On March 23, 1931, after many attempts with small forceps, the foreign body was grasped through the original scleral puncture under the guidance of the ophthalmoscope. A copper foreign body $3 \times 1 \times 1$ mm. was removed. About one third of the vitreous escaped. No injury to lens nor ciliary body occurred. Salt solution was injected into the vitreous after two sutures were taken to close the wound.

Discussion. DR. V. H. BROBECK asked whether the eye should be removed.

DR. G. L. STRADER reminded the Society of the case that Dr. M. L. Black had presented, that had had a copper foreign body in the vitreous for many years without apparent ill effects.

DR. W. H. CRISP said that several cases had been reported where copper was tolerated for a considerable period.

DR. W. A. SEDWICK said that he had seen a few cases go on for two or three years, but that eventually all the eyes had to be removed.

Misfit glasses

DR. EDWARD JACKSON reported two cases that illustrated how common such misfits were and how serious for the wearer. A college boy of twenty years of age had been found myopic by the school nurse seven years before, and had worn glasses from that time. An older brother had very serious myopia. Within the last year, on advice of college friends, this boy had gone to an optometrist. The glasses obtained from him were being worn and at the end of the semester with examinations approaching, his eyes were failing. The vision of 1.1 was not as good as a year ago. He was wearing O.D. -3 D.sph. with -1.25 D.cyl. axis 180° , O.S. -3 D.sph. with -1.25 D.cyl. axis 175° . What he needed was O.D. -2.75 D.sph. O.S. -2.00 D.sph. with no cylinders. Wearing these he had vision of 1.2 plus, and with both eyes 1.3. After wearing them two weeks he was

through with his examinations and the eyes were comfortable.

The other patient, a woman of eighty-five years, was wearing O.D. $+3$ D.sph., O.S. $+2$ D.sph. with $+1.00^\circ$ cyl axis 15° prescribed by a member of this Society. The vision was O.D. 1, O.S. 0.02. In both lenses there were small flakes of opacity; in the right some details of vessels could be seen, in the left only the red reflex. What she required was O.D. $+3.50$ D.sph. with -2.00 D.cyl. axis 112° , O.S. $+5$ D.sph. with -3 D.cyl. axis 108° . With these she had 0.4 plus vision in each eye, and 0.5 with both eyes together. She was able to continue reading, which had been her chief occupation for years, and would not have to wait indefinitely for a dreaded operation. Her eyes could not have been measured by the ophthalmoscope or skioscopy, and the ophthalmometer would have thrown no light upon her case. Alternating supplementary lenses with a sufficient interval between them and including the cross cylinder, was the only method to find what glasses she needed.

Discussion. DR. W. H. CRISP said that it was all too frequent an occurrence for oculists to be careless in testing patients for glasses where some cause for poor vision other than an error of refraction was apparently present. He mentioned a case of cataract where a careful refraction had helped the vision very markedly, and incidentally had removed the patient's symptoms of eye strain.

DR. EDWARD JACKSON exhibited the trial case consisting of plano lenses that had been arranged by himself and Dr. D. H. O'Rourke. Dr. Jackson said that the opticians had apparently been using copyrighted lenses so much that they had been very slow in making up his trial case. The lenses were placed in wire frames with three pockets. The price was \$275. The only other set was made by Wall and Ochs in Philadelphia.

DONALD H. O'ROURKE,
Secretary.

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A GRADUATE SCHOOL OF OPHTHALMOLOGY

Graduate study must hereafter be the greater part of the study of medicine. Almost unnoticed, our institutions are growing into fitness for the education of the workers in medicine of the coming generation. In this development, ophthalmology is still a leading branch of medicine and surgery. It was pointed out in this Journal years ago (Vol. 6, p. 33 and 57) that graduate teaching of the doctor must be of three kinds:

First; to keep the habit of study, every practitioner must gradually extend his knowledge in various directions.

Second; To enable all to keep up with the new things in developing science, to learn of the new opportunities and resources for the relief of suffering and the building up of health, as these become known, we shall still need the short clinical courses, the two weeks' vacation courses, and the congresses and educational sections of our societies.

Third; Now that specialization is accepted and necessary, there must be provision for graduate studies of specialties; to train specialists for their work, as medicine and surgery have now developed.

Preparation for a specialty must begin with fundamental studies. The anatomy, physiology and pathology of the visual apparatus should be studied, with a detail and thoroughness impossible in the undergraduate study required before formal entrance to the medical profession. Also fundamental is the study of optics, in its mathematic, physiologic and experimental aspects. These branches are best studied in laboratories, only found by the student in colleges and universities. With all the development of education outside of established institutions, these will still be needed.

Another reason for the study of ophthalmology in education institutions is the vital unity of medicine. One hundred years ago the private preceptor was a most important teacher of medi-

cine. He knew the unity of medicine, because in his community the practice of his whole profession rested upon him. In this respect the country doctor might be a better teacher than the professor in the medical school. In 1904, at the St. Louis Exposition, Thomas Clifford Allbutt, Regius Professor of Physics at Cambridge University, delivered before the Section on Internal Medicine, an address on "The Historical Relations of Medicine and Surgery," in which he said: "In the minds of academical teachers the notion still survives that the theoretical, or university form, and the practical or technical form of a profession or trade may be taught independent of each other." This he combated strongly: saying of the separation of surgery from medicine; "that the cleavage of medicine, not by some natural and essential divisions, let the blood run out of both its moieties. Thus dangerous visceral operations, and those on the eye, which too often were swiftly disastrous, fell into the hands of wandering and irresponsible craftsmen."

With the rapid development of specialties in the last generation the need of recognizing the essential unity of medicine has become still more important. Development proceeds through increasing differentiation and increasing integration. The more medicine specializes the more closely must all its specialties be united; not with some historic parent stem, but with living interest in each other. The developing specialist must learn, not only his own specialty—he must see modern medicine, the whole group of medical, surgical and laboratory specialties, from the new point of view. This is only possible in the universities, where the different special branches of medicine are developing and reacting on one another. The graduate course at the University of Pennsylvania offered the needed opportunity. The Howe Laboratory with Harvard University, the Wilmer Institute at Johns Hopkins, the graduate opportunities at Michigan and Minnesota, the new department at Washington University, St. Louis, all have this essential connection with other depart-

ments of medicine and surgery. But, curiously, the University of Iowa, in a city of less than twenty thousand, but with its hospitals of 1200 beds drawing on the clinical resources of the whole state, has gone further in developing the new kind of graduate teaching of ophthalmology.

In the older universities the new department has made its way more slowly, to full recognition and cooperation by the older, better recognized departments, academic and medical. In Iowa these older departments are more plastic and in closer touch and sympathy with the new department of ophthalmology; which, with its full-time teachers, its funds for research, its six intern students, its short courses for practitioners, and its western atmosphere of hope and enterprise, has been able to reach quickly a position of leadership.

But it must not be supposed that this new type of teaching a medical specialty has yet attained full development. A great prospect for the future has only begun to open up. Interest, criticism, discussion, experiment, outside observation and suggestion, are needed from those who are working for better opportunities in other branches of graduate medical instruction. We must have a literature of debate regarding all sorts of suggestions, particularly from those who have studied ophthalmology and entered into ophthalmic practice. A suggestive contribution to this literature has been published in this Journal (April, p. 302). Let those who are not teaching, but now in practice, realize their need for help to keep up with the advance of ophthalmology, join the discussion, and contribute their thoughts to the literature of this growing movement.

Edward Jackson.

GUIDANCE IN GRADUATE INSTRUCTION

If any one broad characteristic distinguishes the population of the United States it is eagerness for new methods and new ideas in practical matters. In spite of the rapid advance in standards of medical education in this country, it

may be that, owing to certain crudities more or less inherent in every pioneer civilization, the thoroughness of education as a whole and of basic medical education in particular is still rather below that of western Europe. But a large proportion of our physicians, and above all among the specialties, are awake to the thought that they still have much to learn and they appreciate the need of submitting themselves, at frequent intervals, to supplemental courses of instruction.

The enthusiasm displayed by the Fellows of the American Academy of Ophthalmology and Otolaryngology for the instructional program which has been a unique feature of its conventions for a number of years past has been frequently referred to in the columns of the American Journal of Ophthalmology. If the Academy had accomplished nothing more than to arrange these "conferences" on a great variety of topics it would have acquired lasting distinction among medical organizations, and the combined professions owe a special debt of gratitude to Dr. Harry Gradle, in association with the executive officers of the Academy, for fostering and giving effect to the idea of planning such instruction as an adjunct to the general work of the Academy.

No doubt the instructional committee, in conference with the executive officers, has given a good deal of careful thought to selection of the subjects dealt with from year to year. As is natural and proper in a democratic country and in a democratic organization, much scope has been allowed for expression of the opinions of members as to the kind of instruction which they desired. Such expression of choice plays a very useful part in the arrangements and is responsible for the presentation of novel and valuable topics which might otherwise be overlooked. But perhaps a wider principle in education should also be given careful consideration.

The seeker of instruction and training is not always completely aware of his own needs. The more we know the

more evident it becomes how little we know, or sometimes how little others around us know. Those whose constant duty it is to discover and measure the educational attainments of others are frequently in a position to recognize educational needs and deficiencies which are not obvious to those in whom the needs and the deficiencies exist.

Most of us are more adequately trained in some features of our work than in others, and one important task of educational organization is to provide facilities for making good those defects or gaps in training which are most commonly encountered.

The experience of the two national examining boards should by this time furnish a valuable basis for indicating the fields of greatest educational need among those whose practice is confined to diseases of the eye, ear, nose, and throat or to any part of this group of specialties.

Much has been written concerning the curriculum of the undergraduate student, on the one hand, and as to the curriculum necessary for complete graduate courses, on the other hand. But the needs of the special practitioner who is eager for self-improvement, and who must obtain his facilities in short visits to meetings of the Academy or in attending such work as is offered each summer at Denver, or at Rochester, New York, have been less definitely formulated. Substantial advantages, in addition to those already so happily manifested, might accrue if the examining boards were to establish a committee or committees with the special duty of advising in which fields of ophthalmology and otolaryngology the greatest and most frequent need for ampler teaching and study is encountered.

W. H. Crisp.

AVIATION MEDICINE

The present generation has seen the world on wheels, possibly the next will see the world in the air, for certainly the increase in flying during the past ten years has been little short of mir-

aculous. Probably the stimulus of the war necessity with the incident improvement of air craft was largely responsible.

With the increasing numbers in the air the imperativeness of physical and mental fitness became obvious. Among the first to recognize this were the directors of the aviation services in the World War. The field was entirely new and there were no standards for guidance. Examinations were too rigid in some respects and too lax in others. Gradually many of the errors have been weeded out and tests are now reasonably satisfactory though undoubtedly many changes still remain to be made.

That physical examinations are essential is illustrated by the fact that aeroplane accidents have been found to be much more frequent in the physically defective than in the normal. Though possibly further improvements in aircraft will tend to simplify flying so that less physical perfection will be necessary for air navigators nevertheless it is hard to conceive of flying as ever being done by those so physically and mentally inept as are now privileged to attempt to direct automobiles through the intricacies of modern traffic.

There is of course necessity for knowledge other than that acquired solely in the air and ground study has become much more time consuming for the student aviator than hours in the air.

Among physical requirements the eye and ear rank high in importance. Much time and study have been spent on standardization of ocular and otologic tests for aviators. A differentiation into several groups has been made depending on the type of flying license desired, with corresponding difference in visual requirements. The pilot who intends to fly passenger planes obviously must pass more rigid tests than he who is to fly his own plane only.

Among the important ocular assets are good visual acuity, good fields, normal color perception, normal muscle balance and power, normal depth perception and visual training. Unfortunately the international standards for

physical tests have not been accepted by the United States. Doing so would be a step in the right direction.

At the September meeting of the American Academy of Ophthalmology and Otolaryngology the subject of medical aviation was most interestingly discussed from the governmental, ophthalmological, otolaryngological and general aspects and many interesting features cited. The difference that high altitudes cause in vision, both in loss of acuity and failure of extra ocular muscle balance, with resultant diplopia was mentioned. A chart showing the ill effect of smoking one cigar was shown, more disability being caused by this smoke than by drinking five ounces of cognac. Of great importance were psychologic tests. These proved seventy percent correct in determining whether a candidate would become a successful aviator or not. In the "good" or "bad" groups the prognostication was one hundred percent correct.

The impression from the symposium was that we were dealing with a vital, rapidly-growing industry, outstandingly important in peace and in war and that ophthalmology and otolaryngology were inseparably woven into its progress.

Lawrence T. Post.

VIVAT ET FLOREAT ACADEMIA

The 1931 meeting of the American Academy of Ophthalmology and Otolaryngology has come and gone. Some five hundred members, the majority with their wives, assembled in French Lick during the week of September 14th and struggled mightily with the heat. On the preceding Saturday, the Ophthalmic and Oto-Laryngic Boards held the bi-annual examinations in Indianapolis, investigating the professional capabilities of the applicants. On Monday, the regular meeting opened with a joint session at which the Guest of Honor, Dr. J. C. Beck of Chicago, delivered his address. In the afternoon was the golf tournament, played in a blistering heat over the upper golf course which is hilly enough to excite comment even from a Coloradan. On

Tuesday morning, the Instruction Courses started and were continued for four days. Among them were the two continuous courses in Pathology, one Eye, and one Ear, Nose, and Throat, each fourteen hours in length. The rest of the meeting kept going at full pace until Friday night, the tempo of which pace must be slowed down in the future.

Several features of the Academy meeting deserve special mention. At one of the regular meetings, Major G. R. Callender of the Army Medical Museum presented a statistical report of 110 melanotic tumors of the eye that have been examined at the Museum during the past five years, with a clinical follow-up in the majority of cases. The classification and prognosis, based upon the type of cell found, offered a new line of thought that will bear elaboration. This is the first important paper for the Ophthalmic Section of the Army Medical Museum and it represented the possibilities that such a collection offers. Prof. Ames of Dartmouth had a most unusual and interesting exhibit that he and his associates explained to all interested. They had found a measurable difference in the size of retinal images in many individuals with asthenopic symptoms that could not be explained by other ocular findings. That size difference, amounting at times to as much as 4 per cent, occurred not only in anisometropia as would be expected, but also in some cases of practical emetropia. By means of deep base cylinders, they were able to correct the size difference of the retinal images, in many instances resulting in complete relief from the asthenopic symptoms. Although the work is still experimental and the practical value remains to be proven, it is sufficiently important to arouse the interest of the ophthalmologist and justify his hearty cooperation in their efforts.

Montreal was chosen as the site for the 1932 meeting in honor of the new President, Dr. S. H. McKee. Dr. B. Shurley was made President-Elect.

Harry S. Gradle

BOOK NOTICES

Augenärztliche Eingriffe, ein kurzes Handbuch für angehende Augenärzte (Ophthalmic operations, a short handbook for beginning ophthalmologists). By Professor Dr. J. Meller, head of the first eye clinic in Vienna. Third edition, 352 pages, with 199 illustrations in the text. Price, paper covers, 28 marks; bound, 29.80 marks. Vienna, Verlag von Julius Springer, 1931.

The English editions of this work, under the title of "ophthalmic surgery," and under the editorship of the late Dr. Sweet, have become very popular in the United States, and it is to be hoped that this new German edition will before long be represented by an English translation.

Surgical instruction in book form has rarely been given so clearly and so effectively. As explained by the author in earlier editions, and again in a preface to this third edition, the work is not intended to be a general textbook of ophthalmic operations, but gives a description of the procedures employed by the author himself. Its main purpose is instruction in the art of ophthalmic surgery. "Non eruditus, sed erudiendus, non doctentibus, sed discentibus." It assumes that the reader has spent a fair amount of time in a surgical clinic and in an eye clinic, and has thus acquired preliminary knowledge of surgery in general and of surgical ophthalmology in particular. Much space is devoted to technical details of the principal procedures described and none at all to theoretical explanations. The only procedures described are those used in the author's clinic.

Two important sections have been added in the present edition, namely the intracapsular extraction of cataract and ignipuncture for retinal detachment. A discussion of Professor Meller's views and recommendations with regard to intracapsular extraction will be found in an editorial in the November issue of this Journal. The author's consideration of ignipuncture for retinal detachment carries particular authority be-

cause of his own extensive experience and success with this operation, of which he is an enthusiastic advocate. He emphasizes the fact that the more recent the retinal detachment is, the more frequently tears and holes can be demonstrated, these lesions being very common in fresh detachments, definitely visible in two-thirds of the cases, and certainly present in an even higher percentage, although often undiscoverable by reason of their diminutive size or of their peripheral or concealed location. Very particular attention is devoted in the text to the technique of localization of tears and holes in the retina.

W. H. Crisp.

Detachment of the retina (a contribution to the study of its causation and treatment). By J. Ringland Anderson. 207 pages, 7 colored illustrations, Cambridge University Press. The Macmillan Co. 1931.

This is a very comprehensive study of the subject, covering the field thoroughly as far as our present knowledge exists. The anatomy and physiology of the retina are discussed interestingly

and comprehensively in their relationship to the main thesis. Each chapter is followed by a long list of references. Undoubtedly this book sums up the entire knowledge of the subject to date and will serve for a reference text for those doing research along these lines and will be a guide to the many surgeons who have recently interested themselves in operations for the cure of the tragic condition treated in this book.

There are six chapters as follows: 1. General, 2. The structure and function of involved tissue, 3. Pathogenesis, 4. Differential diagnosis, 5. Treatment, 6. Prognosis.

To the reviewer the second chapter was the most interesting. On that groundwork the reader may build his own theories. Later chapters contain much speculation and many suggestions advanced by past and present workers. Rather obviously many of these will not bear the test of time and will have to be discarded but they are important at the present stage of our lack of knowledge and must be included in a complete work of this kind.

The book is very well written and will interest and repay the readers of it.

Lawrence T. Post.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

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| 1. General methods of diagnosis | 9. Crystalline lens |
| 2. Therapeutics and operations | 10. Retina and vitreous |
| 3. Physiologic optics, refraction, and color vision | 11. Optic nerve and toxic amblyopias |
| 4. Ocular movements | 12. Visual tracts and centers |
| 5. Conjunctiva | 13. Eyeball and orbit |
| 6. Cornea and sclera | 14. Eyelids and lacrimal apparatus |
| 7. Uveal tract, sympathetic disease, and aqueous humor | 15. Tumors |
| 8. Glaucoma and ocular tension | 16. Injuries |
| | 17. Systemic diseases and parasites |
| | 18. Hygiene, sociology, education, and history |

1. GENERAL METHODS OF DIAGNOSIS

Blair, C. J. L. **A new portable corneal microscope.** *Brit. Jour. Opth.*, 1931, vol. 15, June, p. 333.

This instrument consists of the microscope and stand and the source of light. The stand carries a head plate which is applied to the patient's forehead, and the microscope which is capable of magnification of from 10 to 25 times. The source of light, a luminous ophthalmoscope bulb, is attached to the objective end of the microscope on a quadrant arc which can be swung through 180° about the axis of the microscope.

D. F. Harbridge.

Falta, Marcell. **More recent contributions to my approximating test for determination of unilateral blindness, amblyopia, and their simulation.** *Klin. M.f. Augenh.*, 1931, v. 87, July, p. 96.

The approximating test rests on a physiological effect, the convergence of the eyes. The examiner has only to ascertain whether the medial recti muscles of both eyes turn normally inward or not. At the level of the nasal root

and at 15 cm. distance the patient fixates the finger tip held 1 cm. from the median line toward the side of the eye to be examined. If this eye deviates toward the temple it is an absolute sign that it is blind or amblyopic. This is the positive test. If there is no deviation toward the temple it is the negative test and indicates that the eye cannot be very amblyopic or blind. The positive test also shows that there is no binocular vision, and is useful in determining paralysis of accommodation. The method is simple, independent of the intelligence or good will of the patient, can be demonstrated before an audience, gives an objective sign, and allows detection of malingering.

C. Zimmermann.

Hanssen, R. **Technique of gelatine mounting and sudan staining.** *Klin. M.f. Augenh.*, 1931, v. 86, June, p. 820.

To avoid simultaneous hematoxylin-staining of the gelatine with the sections, which renders these indistinct, Hanssen recommends galloxyanin one in 100 aqueous solution of chrome-alum five percent, especially for staining of fat with sudan.

C. Zimmermann.

Musitz, Giga. **Mirror for inspecting the retrotarsal fold.** *Klin. M. f. Augenh.*, 1931, v. 86, April, p. 513.

For protection of the eyeball the oval-shaped mirror has a concave edge corresponding to the curvature of the eyeball. The upper lid is pulled forward with a retractor and the mirror introduced into the palpebral fissure, so that the upper fornix can be seen in all details.
C. Zimmermann.

Wachendorff. **On the settling time of the red blood corpuscles in ophthalmology.** *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 648.

The settling reaction sometimes indicates a worse prognosis of severe ocular tuberculosis. It helps against overdose in tuberculin treatment. If intense in purulent affections and iritis one must think especially of lues.

C. Zimmermann.

2. THERAPEUTICS AND OPERATIONS

Arjona, J. **Injections of alcohol in the practice of ophthalmology.** *Arch. de Oft. Hisp.-Amer.*, 1931, v. 31, Feb., p. 96.

Alcohol injections have been proposed by various authors for the following conditions: senile entropion, pain in absolute glaucoma, epiphora after extirpation of the sac to produce atrophy of the lacrimal gland, strabismus (as a substitute for tenotomy), and to produce temporary ptosis (as a substitute for tarsorrhaphy). These procedures are all based on the fibrogenic action of the alcohol as proved by Zborowsky, Jaensch, Taratin, and the author. Arjona reports excellent results following alcohol injections after extirpation of the sac in three cases of spastic entropion and two cases of persistent epiphora.

M. Davidson.

Betremieux. **Nonperforating pericorneal sclerectomy.** *Arch. d'Ophth.*, 1931, v. 48, May, p. 364.

This type of operation is indicated wherever there is a stagnation of the deeper return circulation of the eye.

The procedure is harmless. Chorioretinitis is an indication, and detachment of the retina in myopic eyes may be prevented if the operation is done early. The writer has had good results in many cases of progressive myopia with intraocular hemorrhage. Naturally other systemic measures such as the administration of iodides should also be used.

M. F. Weymann.

Coppez, Leon. **A new apparatus for the ophthalmological application of medical diathermy.** *Arch. d'Ophth.*, 1931, v. 48, May, p. 348.

As the average duration of a diathermy treatment is thirty minutes, a comfortable applicator must be used. An apparatus is described which resembles a phorometer and is attached firmly to the treatment chair. A thermometer may be placed in the lower cul-de-sac so that exact knowledge of the temperature produced is available at all times. A photograph illustrates the apparatus.

M. F. Weymann.

Cucco, A. **Periocular plastics. Is there an esthetic surgery?** *Ann. di Ottal.*, 1931, v. 59, March, p. 253.

It is important for defects of the eye and its adnexa to be repaired with the smallest possible amount of resultant deformity. An attempt has been made by "beauty specialists" and general surgeons to take over this work, but the expertness of the ophthalmic surgeon, the greater delicacy of his instruments, and his finer technique make reparative surgery about the eye his special province. Thick cicatrices, fibrous cords, and disfiguring suture scars should be avoided. The large experience of the war has markedly improved periocular surgery. The author reviews the history of plastic surgery about the eye.

Park Lewis.

Poos, F. **The action of tuberculin upon the normal eye.** *Graefe's Arch.*, 1930, v. 125, p. 41.

The reaction in the fellow eye produced by repeated injections of tuberculin or by implantation of a capsule

containing tubercle bacilli into the vitreous of one eye was not found to be due to any processes of a specific nature leading to sensitization of the uvea of the second eye. The same histologically diagnosed uveitis in the fellow eye occurred when the tuberculin was injected either in the orbit after removal of the eyeball, into the gluteal muscle, or into the blood stream. The authors felt therefore that in these experiments they were not dealing with a process analogous to human sympathetic ophthalmia but to a chronic intoxication of the entire animal by the bacterial poison diffusing from the capsule into the vitreous. In the animals influenced by tuberculin it was found that where a more severe uveal reaction occurred there was a correspondingly more intensive meningitis. The author's experiments showed that this constitutional action of the poison of the tubercle bacilli was unspecific in the normal organism, since the inflammatory changes produced by it did not differ from those due to other bacterial toxins. The bacterial toxins, including the poison of the tubercle bacilli, must belong to those well defined capillary poisons like dionin and histamin which particularly exert an injurious action upon the capillary vascular system including the entire reticulo-endothelial apparatus.

H. D. Lamb.

Procksch, Maria. The safest way of performing urgent intraocular operations in unclean conjunctival sacs: transpalpebral opening of the anterior chamber according to Sachs. *Klin. M. f. Augenh.*, 1931, May, p. 617.

At 0.75 cm. below the lower lid border an incision of from 2 to 3 cm. is made through the skin, which is dissected down to the lower orbital margin. Close to this the tarsoorbital fascia is separated, and thence the sclera is bluntly reached as far as the limbus, always outside of, and protecting, the conjunctiva. Twenty-six cases, some of acute glaucoma, were successfully operated upon according to this method.

C. Zimmermann.

Sala, Guido. The action of "Armina" on the eye. *Arch. di Ottal.*, 1931, v. 38, April, p. 197.

Armina hydrochloride (Merck), an alkaloid of "Peganum armala" is used by the natives of western Asia and northern Africa and in some parts of North and South America as an exhilarant as well as for its stupefying effect. The solution of Armina hydrochloride one percent is used by local instillation in the conjunctival sac. The pupil remained normal as to size, reaction to light and accommodation. Complete anesthesia developed after five minutes and lasted for a considerable time. The corneal changes and the effect as a vasodilator were studied with the biomicroscope. The intraocular pressure was not affected in any way and no toxic effect was found.

David Alperin.

Samoilov, A. J., and Gohban, V. P. Analysis of the indications for specific therapy in ocular tuberculosis. *Arch. Oftalmologii (Russian)*, 1931, v. 8, pt. 1-2, pp. 16-22.

The indications for specific therapy in tuberculous lesions of the eye are indefinite and controversial. It has been the author's experience that, in the presence of active pulmonary tuberculosis, tuberculin therapy of the ocular lesions often results in dangerous systemic reactions and should be entirely abandoned. In the management of chronic tuberculous lesions of the cornea and iris, tuberculin therapy is contraindicated if the glandular reaction precedes the ocular, or if no focal reaction takes place. Iritis with the formation of tubercles in the iris can be treated by subcutaneous injections of tuberculin, provided these are preceded by a prolonged intracutaneous immunization. In all other cases of ocular tuberculosis specific treatment is indicated with a general starting dose of 0.2 c.c. of 1 to 1,000,000 tuberculin. In choroidal lesions and in recurrent hemorrhages into the vitreous the initial dose should be 0.2 c.c. of a 1 to 10,000,000 solution. A further increase in dosage should de-

pend on the intensity of the focal reaction in each individual case.

M. Beigelman.

Strebel, J. **Technical progress in iontophoresis.** Klin. M. f. Augenh., 1931, v. 86, May, p. 662.

The introduction of the electron tube and graphite eye electrode "Universal" is described as a great advance in iontophoresis treatment

C. Zimmermann.

Trentler, B. **A modified forceps scissors.** Klin. M. f. Augenh., 1931, v. 86, June, p. 830 (ill.).

Trentler has made the outer edges of de Wecker's scissors sharp, so that the blades pressed together form a sharp point. Bands and adhesions are cut with the inner edges, and membranes are perforated with the point and severed by spreading the blades without tearing the iris. The instrument is especially useful in cutting out triangular pieces of membrane.

C. Zimmermann.

Werdenberg, E. **Therapeutic factors and results in ocular tuberculosis.** Klin. M. f. Augenh., 1931, v. 87, July, p. 1.

The individually indicated constitutional therapy is a necessary and main factor for favorable influence on the general disease, for healing of the important primary intrathoracic morbid source, for better reaction to various forms of therapy and thus for curing ocular tuberculosis. The part of climatic alpine cure at Davos in the therapeutic results was great, and not rarely a determining factor, in the majority of Werdenberg's patients.

C. Zimmermann.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Apin, Carl. **Further observations with the use of the cobalt lamp (according to Rössler) for determination of refraction.** Klin. M. f. Augenh., 1931, v. 86, May, p. 636.

Apin gives a report of his observations, with a detailed discourse on the

subject. He thinks that the cobalt lamp cannot be considered as a pure method for determination of refraction, because even in atropin mydriasis an equal size of the colored circles of diffusion can be attained by different adjustments of the eye with the aid of correcting lenses.

C. Zimmermann.

Baquis, E. **Apparent neutralization of the diplopia of convergence and the inherent error in estimate of size.** Ann. di Ottal., 1931, v. 59, May, p. 469.

If the eyes are fixed on a distant object, and without changing the gaze the head is oscillated from right to left and from left to right, the object appears to be stationary, as it actually is. If, then, one looks at several rows of small figures vertically parallel at a distance of about three meters, without focusing on them but imagining that one is looking at a nearer object, and the head is oscillated as before, the more distant objects will seem to move in a direction homonymous with the movements of the head. Now if in the experiment an object is held at the nearer range, the first impression on looking at it indifferently and without definitely changing the focus will be of a diminution in size. These phenomena are explained by the author as being purely mental, our estimate of distance being the combined result of our muscular sense and experience. The synergy of convergence and accommodation being temporarily disturbed while the gaze is at a distance, there is a psychic disparity in size and motion of the distant objects looked at with a momentary accommodative effort.

Park Lewis.

Bartels, Martin. **High myopia in the first few years of life.** Klin. M. f. Augenh., 1931, v. 86, June, p. 770.

Bartels observed seventeen cases of myopia of from seven to twenty-three diopters in children from two to nine years of age. Three had nystagmus, two had divergent and three convergent strabismus, eleven conus, one coloboma of iris and choroid, two atrophic foci at the macula. In six heredity was

proved. In some cases striking disturbances of general growth of the body, sometimes with unusually developed intelligence, were noticed. Bartels distinguishes two kinds of myopia: myopia progressing with normal conditions of growth and, as in his cases, congenital myopia of the first few years of life as a malformation (elongation of axis), perhaps due to early hormonal disorders. The treatment must be generally strengthening, and the myopia must be corrected. Bartels warns against indiscriminate application of pilocarpin in myopia, since he saw detachment of the retina develop immediately after instillation of one drop of pilocarpin.

C. Zimmermann.

Beard, Hallard. **The postcycloplegic test.** *Arch. of Ophth.*, 1931, v. 5, June, pp. 943-947.

The results obtained at the postcycloplegic test should be accepted only in the light of the cycloplegic test, which should be carried out with great care. Should the astigmatic correction vary in the two tests, that of the cycloplegic test should be preferred, except in the case of an unusually intelligent and cooperative patient. Such variation may be due to an error under cycloplegia, to the mydriatic influence on the pupillary area of cornea involved, to irregular action of the ciliary muscle following mydriasis, or to the stenopaic effect of the lids. Great care should be taken in determining the proper amount of the total hyperopia that should be corrected. This will depend upon a number of considerations: (1) the symptoms complained of, such as poor vision for distance, blurring in reading, and so on; (2) whether glasses have previously been worn and, if so, to how great an extent has the hypermetropia been corrected in them; and (3) the type of work which the patient follows. It should also be remembered that on testing both eyes together the patient will as a rule take a stronger correction than for either eye singly. In myopic patients, the full correction can usually be worn, and an undercorrection should be condemned.

M. H. Post.

Bichelonne. **The astigmatism of oblique vision through correcting lenses.** *Arch. d'Ophth.*, 1931, v. 48, May, p. 332.

The results of measurements of the astigmatic effect of biconvex, planoconvex, meniscus, and corrected lenses upon oblique pencils demonstrate the superiority of lenses with corrected curves for clear vision in the peripheral field. These measurements should be considered in the prescription of correcting lenses.

M. F. Weymann.

Blatt, Nikolaus. **Disturbances of accommodation after iridocyclitis.** *Graefe's Arch.*, 1930, v. 125, p. 125.

Among 108 cases of iridocyclitis were found seventeen with resulting weakness of accommodation. This weakness of accommodation occurred in either one or both eyes; in the latter case it was present in different amounts in each eye. The duration and amount of this weakness were chiefly dependent upon the severity and the duration of the iridocyclitic process, but also upon the general constitutional condition and upon those factors which had caused the iridocyclitic process. For testing the accommodation more accurately, the author employed an "accommodatometer" which he had constructed on the principle of Landolt's ophthalmodynamometer. For treatment of this weakness of accommodation after iridocyclitis he used instillations of pilocarpin, faradization of the region of the ciliary body, and exercises of accommodation.

H. D. Lamb.

Colajanni, G. **A new apparatus for examination of the chromatic sense.** *Ann. di Ottal.*, 1931, v. 59, April, p. 360.

The various methods commonly employed for testing the color sense are reviewed. More exact tests and those showing a gradation of color limitations are required for aviators, who are frequently obliged to distinguish signals under adverse conditions, such as a foggy atmosphere, while the plane is in rapid motion, or at a great distance. An instrument termed a chromoestimeter has been designed for making these finer distinctions. A spiral light is pro-

jected through colored discs on a rotating drumhead. Rapidity of motion is governed at will. The mechanism is illustrated with drawings.

Park Lewis.

Coppez, H. **Concerning Graefe's pseudosign (Fuchs's sign).** Arch. d'Ophth., 1931, v. 48, June, p. 385.

As this condition was first described by Fuchs in 1893, it is proposed to designate it as Fuchs's sign. A woman aged thirty-six years had sudden loss of consciousness, with headache, nausea, and vomiting on the following day. A diagnosis of basal subdural hematoma was made. As a result of this attack there was paralysis of the left third nerve without any fundus lesion. Six months later there was no upward rotation, and rotation was diminished in the other directions of the field. In fixation with the right eye there was slight divergence of the left eye and very slight ptosis of the left upper lid. In rotation downward the upper lid was forcefully retracted. Rotation downward and inward increased this retraction, while rotation downward and outward had no effect on the upper lid. There was resistance of the globe to passive rotation with forceps. Vestibular tests revealed spasticity of these muscles supplied by the third nerve in the left eye.

Two previous cases reported by the writer are reviewed, and the conclusion is drawn that the seat of the anomalous muscle action cannot be in the oculomotor nucleus because peripheral paralyses may produce this syndrome. In the case reported the passive resistance to rotation is probably due to spastic paralysis of the muscles supplied by the third nerve, as Behr has called attention to the fact that such spastic paralyses may exist in ocular muscles. The writer had previously assumed that this resistance was due to the formation of fibrous bands.

To explain the lack of retraction of the upper lid in outward and downward rotation it is stated that here probably the fourth nerve has the greatest stimulation, while the third has but little.

The reverse is said to be true on downward and inward rotation where the retraction of the upper lid is maximal. This explanation is not quite clear to the translator because the principal action of the superior oblique muscle, which is supplied by the fourth nerve, is downward and inward rotation. (Excellent photographs.)

M. F. Weymann.

Cowan, Alfred, **Glasses: how should the ophthalmologist write his prescription?** Arch. of Ophth., 1931, v. 5, June, pp. 849-855.

In this paper, Cowan makes a plea for definite instructions from the oculist to the optician as to the curvatures of the lens, of both the anterior and the posterior surface. He goes into detail and explains the various optimum combinations, giving numerous examples.

M. H. Post.

Cucchia, A. **Researches on visual acuity and affections of the optic nerve.** Ann. di Ottal., 1931, v. 59, Feb., p. 130.

During late years there has been an increasing recognition of the need of greater precision in determining the proportionate degree of limitation of perimacular vision as an early diagnostic measure in optic nerve involvements. The author made a clinical study of sixteen cases. He employed the method of Lo Cascio, using the giant perimeter, which has a radius of one meter, with optotypes of varying size. Two meridians, the vertical and the horizontal, were tested from the periphery of the visual field to five degrees from the visual center, the normal range having previously been established. The author concludes that in many cases of optic neuritis, or in degenerative changes within the nerve, diminution of the direct vision will be found in the interpapillomacular region or in the peripheral zone between fifteen and twenty degrees. These changes are not always evident in direct vision, on ophthalmoscopic examination, or in the usual perimetric tests. (Bibliography.)

Park Lewis.

Devé, C. **Better dimensions and forms of correcting glasses; an account of reflections.** *Ann. d'Ocul.*, 1931, v. 168, June, pp. 417-430.

The author points out that the problems of optics resolve themselves into the sacrifice of certain qualities in order to realize others. Reflex images by simple reflection, by double reflection between the glass and cornea, and by double reflection within the glass are studied.

The author concludes in general, that a compromise must be made between the size of field of sharp vision and the nuisance of reflex images. Lenses of less diameter and a lesser base curve than those of the present practice will diminish the reflex images.

H. Rommel Hildreth.

Di Fede, N. **Observations on the chromatic sense of the ant.** *Arch. di Ottal.*, 1930, v. 37, May, p. 178.

While in man total achromatopsia is an anomaly accompanied by such grave ocular changes as photophobia, albinism, and diminution of visual acuity, in the insect this inferior state is a physiological phenomenon. For the ant, difference in colors does not exist, its spectrum consisting of a luminous streak.

David Alperin.

Duane, Alexander. **Binocular vision and projection.** *Arch. of Ophth.*, 1931, v. 5, May, pp. 734-753.

This contribution is a second abstract from the papers of the late Alexander Duane, and forms an excellent review, with certain original commentaries, on the subject with which it deals. It does not lend itself to abstraction, however, as the full argument of the paper must be followed for clear understanding of the matter.

M. H. Post.

Friede, R. **On ring-stained contact glasses for albinism.** *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 649.

The ring-stained contact glasses recommended by Ascher (v. 85, p. 829) have the disadvantage of excluding the peripheral field of vision, accumulating dust and bacteria at the margins, al-

lowing only inadequate correction of ametropia, requiring daily repeated changing, and being very expensive (cost about \$12.50 a piece). They can in no way supplant the operative method of implanting opaque material into the lids.

C. Zimmermann.

Gifford, S. R. **Test types for estimating with Worth's amblyoscope the vision of malingerers.** *Arch. of Ophth.*, 1931, v. 5, June, pp. 918-919.

The author, in searching for a new test for malingering, found Worth's amblyoscope of value. Placing the tubes converging before the eyes of the patient, the image of the right eye appears far to the left, and that of the left to the right. In many instances the malingerer would mistake as to which image was being seen and by which eye and would give a reply that convicted him. For this purpose, Gifford has had a set of semitransparent cards made, with print and numbers corresponding to vision from 20/200 to 20/20.

M. H. Post.

Heine, Leopold. **The use of contact glasses.** *Lancet*, 1931, v. 1, Mar., p. 631.

According to the author the ordinary sets of contact glasses do not contain a sufficient variety of lenses to give satisfactory results. The radius of the contact ring is not sufficiently varied to make the proper contact. The glasses should progress by quarters in strength and the contact ring by halves.

In adjusting the glass a small rubber sucker is used. In removing those contact glasses which have become firmly adherent the sucker is pressed down firmly on the middle of the cornea to drive out as much air as possible. The patient then moves his eye from side to side, thereby loosening the glass.

The indications for use of the contact glass as given by the author are numerous. Besides the various forms of ametropia the contact glass is valuable for serpigenuous ulcers of the cornea, progressive abscesses, and other forms of keratitis, especially if the concavity of the glass is smeared with an antiseptic ointment. Among other conditions

stated to be benefited by the use of the glass are neuroparalytic keratitis, acne rosacea, vernal catarrh, trachoma, pemphigus, hay fever, keratoiritis, dystrophia marginalis, and lagophthalmos. In the author's experience these lenses constitute the best treatment for color-blindness and its photophobia, improving the vision and reducing nystagmus. Other indications include the treatment of squint, protection of the eye from occupational irritants, and finally a cosmetic indication to change the color of the iris. (Ten illustrative cases.)

M. E. Marcove.

Helmbold, R. Sclerokeratometer. Klin. M. f. Augenh., 1931, v. 86, April, p. 510.

In order to secure proper fitting of contact glasses, an exact knowledge of curvatures of the cornea and sclera is necessary. To measure these curves Helmbold has constructed a suitable container of forty-two movable metal rods in a space of twenty mm., the ends of the rods forming a narrow band which adjusts itself to the curvatures of the cornea and sclera, where it can be fixated by screws. The profile thus obtained can be copied with lead pencil on paper. The apparatus is manufactured by Zeiss, Jena.

C. Zimmermann.

Poos, F. Experimental contribution to the question of common factors in the genesis of myopia. Graefe's Arch., 1930, v. 125, p. 1.

The author selected fifteen young rabbits, of which eight were seven weeks, four were eight weeks, and three were nine weeks old. Each rabbit was fastened down in the ordinary prone position to the circumference of a horizontally revolving wheel. This wheel was three meters in diameter and by a motor was revolved twenty times each minute. The young rabbits were turned on this wheel for seven hours a day for varying periods up to seven months. After this experience there was noted in the skeletons of all the eight animals dissected a scoliosis of the skull and of the vertebral column but no deviation

from the normal in development of the eyeball.

H. D. Lamb.

Quinan, Clarence. The handedness and eyedness of speeders and of reckless drivers. Arch. Neurol. and Psychiat., 1931, v. 25, April, p. 829.

The author studied 2,331 university students and 475 speeders and reckless drivers to determine the dominant hand and eye. Of the university students nineteen percent, of the speeders 26.8 percent, and of the reckless drivers 45.4 percent were right-handed and left-eyed.

M. E. Marcove.

Rinaldo, S. The index of refraction of the fetal crystalline lens. Ann. di Ottal., 1931, v. 59, Feb., p. 120.

The author has examined the crystalline lenses of fetuses at various periods of development and has found an increase in the index of refraction in the various strata. This is slight in the cortex but more marked in the nucleus. (Bibliography.)

Park Lewis.

Sanna, G. Mechanism of posterior polar staphyloma in myopia of high degree. Ann. di Ottal., 1931, v. 59, April, p. 309.

The various theories of malignant myopia are analyzed and discussed. The eyes of several myopes which had been seen before death were examined histologically. The author concludes that the ectasia was due to dissolution of the scleral fibers consecutive to choroiditis, and that primarily these changes were of anatomic origin and due to congenital deficiencies in the scleral membrane with a tendency on the part of the choroidal vessels to congestion. Contributing features are prolonged use of the eyes for near work, circulatory disturbance from any cause, and toxic conditions. The effect of congestion is to cause absorption of the scleral fibers, permitting posterior ectasia. This condition is furthered by thinning of the intervaginal cul-de-sac and by the foramina for passage of the ciliary nerves and arteries. (Bibliography, plates.)

Park Lewis.

4. OCULAR MOVEMENTS

Gaudissart. **Paralysis of lateral movements of both eyes and dissociated nystagmus in multiple sclerosis.** French Oto-Neuro-Ophth. Soc., 1930, June; in Riv. Oto-Neuro-Oft., 1930, v. 7, Sept.-Dec., p. 482.

The author reports the cases of nine patients affected by multiple sclerosis who showed the following ocular symptoms: The eye in adduction could not move beyond the mid line, the eye in abduction showed more extended lateral movements and showed also wide, slow, irregular horizontal nystagmoid movements. Some of these cases showed paralysis to the right side, and paralysis of elevation and convergence. There was no spontaneous nystagmus or diplopia. *Melchior Lombardo.*

Giraudi, G. **Syndrome of tumors of the apex of the temporal pyramid.** Riv. Oto-Neuro-Oft., 1931, v. 8, Jan.-Feb., pp. 1-62.

The author gives a brief account of cases showing the syndrome of tumors of the apex of the pyramid, which he found in the literature, and he reports the clinical, anatomical, roentgenologic, and histopathologic findings of a case of carcinoma of the epipharynx which caused first a typical syndrome of the apex and then a syndrome of the upper orbital fissure and Jackson's syndrome. He discusses the etiopathogenesis, the clinical symptomatology, the pathologic anatomy, and the roentgenology of similar cases. The etiopathogenesis is represented by primary malignant tumors of the bones forming the region of the pyramid; by similar tumors diffused by near or transmitted from distant organs; by cysts; by aneurism of the internal carotid; and by pseudotumors of tuberculous or luetic origin. The clinical symptomatology includes auricular disturbance, the trigeminal syndrome, and the abducens nerve syndrome with paresis or paralysis of the external rectus muscle. Rarely the Claude Bernard-Horner syndrome has been noted. The anatomopathologic and radiographic findings vary with the

nature and the original site of the tumor. The author closes his long article by referring to the differential diagnosis between this and the syndrome of many other intraocular lesions, the syndrome of tuberculous or luetic pseudotumors, and lesions of traumatic origin. (Bibliography and 18 figures.)

Melchior Lombardo.

Kreinler and Scheim. **A case of Parinaud's syndrome with labyrinthine disturbances. Considerations on the mechanism of this syndrome.** French Oto-Neuro-Ophth. Soc., 1930, June; in Riv. Oto-Neuro-Oft., 1930, v. 7, Sept.-Dec., p. 484.

A woman presented Parinaud's syndrome associated with right hemiparesis and cerebellar and labyrinthine disturbances, including spontaneous nystagmus. The labyrinthine reflexes regulate the tonus of the ocular muscles. Voluntary innervation of associated movements gives origin to a preformed mechanism which is some kind of oculolabyrinthine reflex. Parinaud's syndrome is the result of a lesion of the oculolabyrinthine paths of association. As a result of this lesion the reflex cannot be produced and voluntary innervation cannot cause the movement of elevation of the eyeballs.

Melchior Lombardo.

Masselin, M. **The W. R. Hess method of graphic representation of oculomotor disturbances.** Ann. d'Ocul., 1931, v. 168, May, pp. 352-370.

The method involves the use of a screen marked off in horizontal and vertical lines at definite intervals with a small central square outlined by eight red marks and a larger outer square with sixteen red marks. Before the right eye is placed a green glass with red before the left. The patient then touches the red marks with a green-colored indicator, the result being charted. The procedure is repeated with the eye glasses reversed.

The advantages claimed are simplicity, a permanent record that is quantitative as well as qualitative, and detec-

tion of minute amounts of paresis. The method is to be used in addition to the usual muscle examinations.

H. Rommel Hildreth.

Ohm, J. **Simultaneous ophthalmoscopy of both eyes and divergent nystagmus.** *Klin. M. f. Augenh.*, 1931, v. 86, June, p. 776 (ill.).

Ohm describes his double ophthalmoscope for simultaneous observation of both optic discs in investigating the relations of binocular movements. He ascertained that circular nystagmus oscillated in the same sense, vertical in the same and opposite senses. Horizontal nystagmus may swing partly from right to left and vice versa, partly contrary, i.e. in the sense of convergence-divergence. A case of spasmus nutans which is described presented a new sign, the amplitude sign, which consists in increase of amplitude in each eye during abduction and decrease during adduction; and also a hitherto unobserved convergence-divergence nystagmus. These types are an important section of dark nystagmus, with which Ohm classes the nystagmus of miners, of small children in dark homes (spasmus nutans), and of young dogs and cats which after birth are kept in the dark. A peculiarity of occupational nystagmus consists in the checking influence of maximal voluntary innervation upon it. The possibility of a divergence center is discussed but its existence is regarded as not proved.

C. Zimmermann.

Sedan. **Postdiphtheric oculogyral paralysis.** *French Oto-Neuro-Ophth. Soc.*, 1930, June; in *Riv. Oto-Neuro-Oft.*, 1930, v. 7, Sept.-Dec., p. 483.

A girl of fourteen years showed paralysis of movement to the left. Convergence was not affected. Neurologic and serologic examinations were negative. A culture of the pharyngeal mucus showed diphtheria bacilli. In such cases the author injects 650 c. c. of serum, which, he asserts, causes disappearance of the paralysis in three or four months.

Melchior Lombardo.

Taussig and Dosuzkov. **Permanent conjugate ocular deviation in epidemic encephalitis.** *French Oto-Neuro-Ophth. Soc.*, 1930, June; in *Riv. Oto-Neuro-Oft.*, 1930, v. 7, Sept.-Dec., p. 482.

Two patients, as sequels of attacks of lethargic encephalitis suffered several years previously, showed the following syndrome: permanent conjugate deviation, dropping of the superior lid of the eye toward which both eyes were deviated, and contralateral muscular hypotony.

Melchior Lombardo.

5. CONJUNCTIVA

Barrow, R. H. B. **An epidemic of conjunctivitis due to infection with bacillus fecalis alkaligenes.** *Brit. Jour. Ophth.*, 1931, v. 15, June, p. 319.

The epidemic occurred on a training ship for boys aged eleven to sixteen years. There was a general hyperemia of both bulbar and palpebral conjunctiva, with follicles in the upper fornix along the tarsal margin. In all except one case the lower fornix was free from follicles.

No case had follicles on the bulbar conjunctiva. There was a good deal of photophobia and lacrimation, and a small amount of mucopurulent discharge. The condition of these cases can best be described as very similar to the early stage of trachoma. The rapid spread of the infection negated trachoma. Duration was about ten days, and the cases were treated with boric acid lotion, mercuric chloride lotion, and boric acid and zinc lotion. The latter lotion caused marked irritation and was discontinued. The essential treatment seemed to be frequent cleansing of the conjunctival sac.

Cultures of the Gram-negative bacillus conform in their growth characteristics and fermentation reactions to those of bacillus fecalis alkaligenes. The germ belongs to the coliform group, is not Koch-Weeks' bacillus or Morax-Axenfeld bacillus, does not ferment carbohydrates, is strongly alkaline, and is frequently found in the intestinal canal. It is probably a saprophyte.

D. F. Harbridge.

Castresana y Guinea, A. **Tuberculosis of the conjunctiva.** *Rev. Cubana de Oft. y de Oto-Rino-Larin.*, 1930, v. 3, Nov., p. 279.

While tuberculous involvement of the eye is usually secondary, it may also arise primarily in the cornea and conjunctiva. Of the latter the incidences reported vary from one in six thousand to one in thirty-three thousand patients. The majority of cases are in adolescent males. Actual involvement of the conjunctiva by tuberculosis may be either palpebral or bulbar, or they may be combined. Of the cases reported, seventy percent were palpebral, twenty-two percent bulbar, and eight percent mixed. The forms in which the disease occurs are discussed, including the nodular, the vegetating, the ulcerative, and the mixed. *A. G. Wilde.*

Colombo, G. L. **The therapeutics of vernal conjunctivitis. Light as a causative agent.** *Ann. d'Ocul.*, 1931, v. 168, May, pp. 370-379.

An internal state predisposes to this disease with an external agent acting to precipitate an attack. The author holds that light is active in producing symptoms. His treatment therefore consists first in protection against certain kinds of light (such as ultraviolet) by suitable glasses, and second lessening the sensitivity of the conjunctiva by antiphotogenic collyria. Cures are reported. *H. Rommel Hildreth.*

Falta, Marcell. **Clinical viewpoints on trachoma.** *Klin. M. f. Augenh.*, 1931, v. 86, June, p. 821.

The polymorphous appearance of trachoma depends on the local disposition of the conjunctiva, that is its resistance to the trachoma virus. It is influenced first by the state of health of the conjunctiva and then indirectly by climatic, social, economic, and cultural conditions, irrespective of race and individuality. In Hungary, where trachoma is endemic, its type has changed for several years. Formerly the papillary exuberances were predominant, but lately an insidious folliculosis, which ought to be called

granulosis, without irritation of the eye or subjective symptoms has made its appearance. At the medial angle of the upper fornix some prominent round or irregularly quadrilateral yellowish to pale pinkish solid granules are observed which later spread to the plica semilunaris and the upper portion of the ocular conjunctiva, without any secretion. As illustrated in two cases, after six months or after years this slight form may turn into malignant trachoma. Round grayish-white granules which have developed in the tarsal conjunctiva are a reliable sign of trachoma even if there are no other visible changes. These are the initial granules of trachoma, which later turn into larger projecting granules, and are a valuable early diagnostic sign. Falta calls attention to the fact that in trachomatous patients without apparent secretion, after sleep yellowish-gray crusts stick to the lashes and angles of the eye which are nothing but dried secretion and contain the virus. If they are conveyed into healthy eyes malignant trachoma may be induced. Radical treatment by thorough curetting of the whole conjunctival sac is recommended. Different from this type is the harmless follicular conjunctivitis.

C. Zimmermann.

Fazakas, Alexander. **Reposition of the plica semilunaris as an operation for pterygium.** *Klin. M. f. Augenh.*, 1931, v. 86, June, p. 808 (ill.).

The usual operations for pterygium, especially its transplantation downward, are apt to increase by cicatricial retraction the displacement of the plica semilunaris caused by the traction of the pterygium, which often is the cause of epiphora. To avoid this Fazakas has devised the following operation: A piece of conjunctiva bordered by the old medial lacrimal furrow and the medial margin of the dislocated plica is cut out. Then the dislocated plica and the pterygium connected with it are undermined, and the upper and lower borders of the pterygium are incised up to the cornea. After its detachment from the cornea the most important part of

the operation is fixation of the plica in its normal position with two or three sutures. During this the pterygium retracts in its whole length on the sclera and is secured in this position by the plica closely connected with it. Its borders are sewn on to the corresponding parts of the conjunctiva, and the edges of the bulbar conjunctiva in front of the apex of the pterygium are united by a suture. In all six cases ideal success was obtained, with subsidence of epiphora. *C. Zimmermann.*

Fehmi, Nuri. Autoserotherapy in trachoma. *Rev. Internat. du Trachôme*, 1931, v. 8, April, pp. 68-70.

Fehmi used autoserotherapy according to the method of Angelucci and Salvati in fifty cases of trachoma. In florid trachoma a diminution in congestion, lacrimation, and photophobia was noted after six to seven injections. In the other stages no amelioration occurred. Granulations and tarsoconjunctival hypertrophy were not influenced, while in control cases submitted to classical treatment there was definite improvement. The author concludes that autoserotherapy is of only slight value in trachoma.

Phillips Thygeson.

Giani, Piero. Research on the presence of a bacteriophage in the tears. *Arch. di Ottal.*, 1931, v. 38, Feb., p. 65.

Following the discovery of a bacteriophage in the nasal secretion for the *Bacillus pyocyaneus* and the bacteria of Löwenberg-Abel and Perez, the author thought it opportune to study the possibility of the presence of a lytic principle in the individual suffering with conjunctivitis. In the main the results were negative. *David Alperin.*

Kaminski, D. S. Denig's transplantation of labial mucous membrane in trachoma. *Klin. M. f. Augenh.*, 1931, v. 87, July, p. 60. (Ill.)

Within the last two years Kaminski performed twenty Denig operations, and he reports on three cases in which after more than one operation of this

type parts of the transplanted mucous membrane were excised and examined histologically. In all three cases the transplanted pieces showed typical trachomatous infiltration. However, in many cases with pannus, where other methods fail, the Denig operation gives favorable results. The transplanted flap becomes involved in all cases in which the trachomatous process continues. Pannus develops by continuity from the ocular conjunctiva to the cornea, and not mechanically by friction of the conjunctiva on the cornea.

C. Zimmermann.

Keller. Conjunctivitis in Indo-China. *Arch. d'Opht.*, 1931, v. 48, May, p. 348.

If trachoma is included, four-fifths of the ocular affections of the population of Indo-China are some form of conjunctivitis. The types are Koch-Weeks, Morax-Axenfeld, gonococcal, phlyctenular, vernal, and a peculiar hypertrophic condition. The general uncleanliness of the inhabitants is the greatest factor in the dissemination of these diseases. The acute Koch-Weeks type is most frequent, but is easily cured by the use of nitrate of silver. One percent silver nitrate is used to irrigate the lacrimal sacs in Koch-Weeks and in gonorrheal infections, and it has been found most efficacious. The gonorrheal cases are mostly of extragenital origin, and due to uncleanliness. In 1929, 318 individuals were seen who were blind in both eyes from gonorrheal infection. Trachoma rarely causes complete blindness. If seen early the type of gonorrheal infection common in this region yields readily to treatment. The hypertrophic conjunctivitis involves mostly the lower lid and resembles the papillary form of trachoma. Under treatment with silver nitrate it is invariably cured within six to eight weeks without permanent damage. The great problem in the control of conjunctivitis in Indo-China is the teaching of cleanliness to the inhabitants. *M. F. Weymann.*

Kulinski-Popova. Unilateral trachoma in Kuban (North Caucasus).

Arch. Ophthalmologii (Russian), 1931, v. 8, pt. 1-2, pp. 118-122.

Among 10,986 trachoma cases treated during the last twenty years in the eye clinic of the Medical Institute of Kuban, 290 or 2.7 percent were unilateral. Corneal involvement and malposition of the eyelids (entropion, trichiasis) were found to occur more frequently in unilateral than in bilateral trachoma. Of the 290 patients affected with unilateral trachoma, twenty-six, or 9.2 percent, lost sight in the affected eye, while the incidence of blindness in bilateral trachoma hardly exceeds 2 percent. The author believes that any theory of the pathogenesis of trachoma must take into consideration this peculiarly grave possibility of unilateral trachoma.

M. Beigelman.

Mikaelian, R. C. Has the bacillus of Noguchi a specific intradermal reaction in the trachomatous? Rev. Internat. du Trachôme, 1931, v. 8, April, pp. 64-68.

Using two antigens, the first a suspension of heat-killed bacterium granulosis and the second a filtrate of the same emulsion, Mikaelian failed to demonstrate a specific intradermal reaction in fifty trachomatous individuals tested.

Phillips Thygeson.

Salvati. A case of tuberculosis of the conjunctiva treated with heliotherapy. Arch. di Ottal., 1931, v. 38, April, p. 218.

A case of tuberculosis of the bulbar conjunctiva was cured by sunlight and intramuscular injection of iodine.

David Alperin.

Schousboë. Medical treatment of trachoma. Rev. Internat. du Trachôme, 1931, v. 8, April, pp. 70-105.

Schousboë gives an excellent review of the medical treatment of trachoma and analyzes the fundamental principles involved. He stresses the fact that, left to itself, the trachoma virus produces an essentially chronic condition which evolves slowly and which may heal spontaneously without leaving traces. Secondary infection aggravates the disease and may be even considered indispensable to the continued

existence of the trachoma virus. Consequently the elimination of these microbial invaders is one of the necessary steps in the cure of the disease. The author also stresses the fact that the granulations are not the cause but the effect of the disease and that cure cannot be obtained by destroying the granulations alone. In the more serious forms of the disease the granulations may be few or absent and the conjunctiva may present only a diffuse brawny infiltration as in a fleshy pannus. The therapeutic ideal should not be to obtain cicatrization of the mucous membrane in block but, even for the more serious forms, a return of the membrane to normal. Surgical treatment is much more apt to be mutilating than beneficial.

Phillips Thygeson.

Sédan, Jean. Infection of three children by trachomatous parent who presented a diplobacillary conjunctivitis. Rev. Internat. du Trachôme, 1931, v. 8, April, pp. 62-64.

Sédan states that an acute conjunctivitis not only increases the communicability of trachoma but exalts the virulence of the virus itself. He cites the case of three children of trachomatous parents who for years failed to contract the disease in spite of extremely poor hygienic conditions, but did so when the father became infected with an acute diplobacillary conjunctivitis.

Phillips Thygeson.

Vejdovsky, V. Operative treatment of trachomatous pannus by implantation of buccal mucous membrane (procedure of Denig). Rev. Internat. du Trachôme, 1931, v. 8, April, pp. 57-62.

Vejdovsky describes Denig's operation for trachomatous pannus, namely a perietomy with transplantation of buccal mucous membrane to the superior limbus. The author states that perietomy (modification of Löwenstein) gives the better result and that of fifteen cases operated on by this method pannus recurred only in one.

Phillips Thygeson.

Weinstein, Paul. **Contribution to the etiology and therapy of vernal catarrh.** *Klin. M. f. Augenh.*, 1931, v. 86, June, p. 802.

Weinstein examined thirty patients with vernal catarrh as to the calcium content of the serum, the alkaline reserve, and intracutaneous reactions to different pollens. The biochemical investigations are arranged in tabular form. The intracutaneous reaction was positive in nine cases only. The author's conclusions are: In the etiology of vernal conjunctivitis an important rôle is to be attributed to the disposition and the shifting of the acid-basic-equilibrium. The combination of vernal conjunctivitis with bronchial asthma and the oversensitiveness to certain pollens suggest its classification under this group of anaphylactic diseases. Endocrine preparations (parathyroid, adrenalin; ovary, testicle), calcium drops, and D-vitamin are indicated on account of the dysfunction of the nervous system and of the endocrine glands in vernal conjunctivitis. *C. Zimmermann.*

6. CORNEA AND SCLERA

Abramowicz, I., and Grossman, F. **Experimental investigation upon the introduction of neosalvarsan into the eye by ionization.** *Arch. d'Ophth.*, 1931, v. 48, June, p. 443.

Using the electrodes of Stocker and Birkhäuser with a one percent solution of neosalvarsan at the cathode, an attempt was made to drive arsenic ions into the anterior chamber of rabbits' eyes by iontophoresis. Cocain anesthesia was used. After the application of the current the eye was irrigated and the aqueous tested for arsenic. Nine experiments are given in detail.

It was found that after a minimum time of twenty minutes, with a current of two milliamperes, and a solution of one percent neosalvarsan, traces of arsenic could be detected in the aqueous. A slight opacity consisting of epithelial and endothelial edema occurred at the site of application of the electrode, whether or not cocain was

used. This disappeared in twenty-four hours without permanent damage.

As experimental syphilitic interstitial keratitis has been benefited by salvarsan injected into the anterior chamber, the passage of arsenic into the aqueous by ionization should have a clinical value. Experiments are now under way to determine by clinical observation the exact dosage for man.

M. F. Weymann.

Addario, C. **Specific and nonspecific corneal pannus in trachoma.** *Ann. di Ottal.*, 1931, v. 59, Jan., p. 74.

When a case of trachoma with pannus, hitherto quiescent, suddenly develops acute symptoms such as increased secretion, lacrimation, photophobia, and blepharospasm, with the lids held so tightly together that the eyeball can with difficulty be examined, the condition should be carefully investigated. Often the attack will be found to be due to irritation of the lids by reparative pannus. This frequently, but not always, accompanies the cicatricial period of trachoma. Immediate relief is obtained by canthoplasty at the external angle, with a two percent silver nitrate solution applied to the conjunctiva and promptly neutralized. Children often escape pannus tenuis, while it is common in the adult. In acute form, it begins with grayish pseudophlyctenules. These are the beginning of vessels running in parallel lines around the upper part of the cornea, which loses its clearness. The author urges that follicularis and pseudophlyctenularis are more exact descriptions than crassus and tenuis. The former is of traumatic origin from trichiasis, blepharospasm, and other forms of local irritation.

Park Lewis.

Bettremieux. **Nonperforating pericorneal sclerectomy.** *Arch. d'Ophth.*, 1931, v. 48, May, p. 364. (See Section 2, Therapeutics and operations.)

Bohm, B., and Fassel, M. **Marginal degeneration of the cornea.** *Oft. Sbornik*, 1930, v. 5, pp. 174-178.

Two men aged respectively fifty-eight and fifty-seven years were af-

flicted with a condition of slow insidious onset. In the first man the condition had begun twenty-two years previously. It was retarded for eight years by cauterization. The second man had diminished vision for six months and had chronic trachoma. There was thinning and arching forward of the periphery of the cornea, which centrally was opaque, and this was accompanied by superficial vascularization in the entire circumference. Reduction of vision was chiefly a result of a considerable astigmatism. In both cases there was hepatic hypofunction. Feeding of calves' liver produced no change. Vision was improved by cautery, Elliot's trephining, and suture of the dilated part.

G. D. Theobald.

Carvill, Maude. **Interstitial keratitis—further report.** Jour. Amer. Med. Assoc., 1931, v. 96, June 6, p. 1936.

This paper reviews two hundred cases of interstitial keratitis, one hundred of which had received intense antisiphilitic treatment, and one hundred only desultory treatment. These cases were originally reported in 1925. Of sixty-seven of the one hundred treated cases, twenty-three had improved vision, thirty-two showed no change, nine had diminished vision, and three were not accounted for. In five of the nine cases in which the vision had failed there were complications. In ninety-three percent of the treated cases injections were begun early in the involvement of the primary eye. Among these cases there were eighteen, or nineteen percent, in which the other eye showed no symptoms of interstitial keratitis, and of these, sixteen have shown no sign of involvement of the second eye within a period of five to twelve years after the subsidence of the condition in the primary eye. One patient showed no symptoms of interstitial keratitis in the second eye until eight years after subsidence of symptoms in the primary eye. He had had five courses of neoarsphenamin. Later ocular complications, occurring in four patients, were syphilitic iritis, cataract,

and acute glaucoma secondary to severe diabetic chorioretinitis.

It is significant to note in the author's report that the incidence of new cases of interstitial keratitis has fallen off from 0.5 percent of the new cases treated in 1914 and 1915 to 0.27 percent in 1929 and 1930.

Two cases are reported which indicate that interstitial keratitis is not prevented by the treatment of congenital syphilis in earlier years.

George H. Stine.

D'Amico, D. **Contribution to the study of keratoconus.** Ann. di Ottal., 1931, v. 59, May, p. 456.

The uncertainty of the pathogenesis of conical cornea makes it impossible to ascertain in which tissue the initial deficiency lies, whether in the endothelium, in the membrane of Descemet or of Bowman, in the stroma, or in the elastic layer. This also adds to the difficulty of determining the best methods of treatment. These have been empirically considered as the medical, the optical, and the surgical. In most cases no dyscrasia or constitutional deficiency is present, hence internal treatment does not seem to be indicated. The corneal irregularity may preclude the effective use of glasses. Raehlmann's conical lenses have not been practical and in most cases the contact lenses of Fick and Sulzer cannot be tolerated. The solution used between the cornea and the glass lens in the hydroscope of Segrist becomes turbid and the apparatus can be worn for a short time only. With our present knowledge the only effective remedial measures are surgical. Various methods have been employed. Optical iridectomy has not arrested the process. (A narrow iridodesis upward has greatly improved vision—Translator's note.) Segments have been removed from the cornea both above and below, with a view of changing the curvature. The summit of the cone has been touched with silver nitrate for the purpose of forming a retracting scar. In the author's case, a fine galvanocautery was employed, the cornea being touched in a series of

points in a semilunar area below the apex of the cone. This was repeated at intervals of a few days and finally the cornea was punctured. The leucoma was ultimately tattooed. The small perforation of the cornea is considered essential to the formation of a firm retracting scar.

Park Lewis.

Derer, J. Spontaneous cure of a parenchymatous keratitis. *Oft. Sbornik*, 1930, v. 5, pp. 150-152.

A female aged twenty-one years was admitted to hospital with typical interstitial keratitis. Blood Wassermann +4. Antiluetic treatment and atropin were used, but were discontinued a week later, because the patient was removed to the surgical ward on account of an acute suppurative mastoiditis. She was in the surgical ward for two months and had a temperature between 37.5 and 39.5 C. for four weeks. Atropin was used at irregular intervals. When readmitted to the eye clinic, the left eye was entirely quiet, and opacities and vessel remnants could be seen only by oblique illumination. The blood Wassermann was negative, Sachs-Georgi ++.

G. D. Theobald.

Friede, Reinhard. Permanent results of chemical and mechanical tattooings. *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 665.

Friede discusses the different methods with the supposition that the chemical stainings in use promise results not lasting more than five years. With regard to peripheral tattooing of albinotic eyes the contraction of the visual field is a great obstacle and the implantation of opaque bodies in the lids is preferable as being so far the best permanent method.

C. Zimmermann.

Klauber, E. Contribution to the therapy of rodent ulcer. *Oft. Sbornik*, 1930, v. 5, pp. 171 to 173.

In a man aged fifty years, with a positive Wassermann, a progressive corneal affection of the type of a rodent ulcer healed rapidly and permanently under combined salvarsan and mercurial treatment. In two women aged

respectively sixty-five and forty-four years (blood Wassermann negative) a typical rodent ulcer was arrested, when beyond internal iodine medication. The progressive margins of the ulcer were impregnated with five percent gold chloride and tannin (Knapp's method). In all cases the center of the cornea remained transparent and serviceable vision was retained. The clinical aspect of rodent ulcer may hide corneal diseases of varied etiology which necessitate a correspondingly varied treatment.

G. D. Theobald.

Kulinski-Popova. Unilateral trachoma in Kuban (North Caucasus). *Arch. Oftalmologii (Russian)*, 1931, v. 8, pt. 1-2, pp. 118-122. (See Section 5, Conjunctiva.)

Planta, Peter. Bilateral serpent ulcer with suppuration of the lens and post-operative panophthalmitis as expression of constitutional inferiority. *Klin. M. f. Augenh.*, 1931, v. 87, July, p. 39. (Ill.) (See Section 9, Crystalline lens.)

Rubert, J. Extraction of senile cataract within the capsule in keratoconus. *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 615. (See Section 9, Crystalline lens.)

Scotti, P. Contribution to our knowledge of episcleral tuberculosis. (One plate.) *Ann. di Ottal.*, 1931, v. 59, May, p. 430.

A woman of sixty-one years had a slight blow on the left eyeball from a blade of hay. It caused intense irritation with abundant secretion. Under the usual treatment it was relieved in a few days. Six weeks later there was a renewal of the inflammation in the eye which had been so slightly injured, with intense pain, photophobia, and lachrimation. The irritation had continued, and at this time a small fleshy excrescence had appeared at the external limbus. The tumor appeared to be growing and interfered with closure of the lids. The patient was in poor health and had suffered for some months from a bronchial affection. The growth was grayish-yellow, firm, not painful, with some conjunctival edema extending for about

a centimeter around the corneal margin. Operative interference was refused, and some four months later the woman reappeared with an increase of all the symptoms, marked conjunctival hyperemia, and intense edema. The neoplasm, at first localized, now formed a pad around the cornea, with on the external side a round ulcerated necrotic spot. The pain had become excruciating. An operation was undertaken but the mass could not be completely removed. A year and a half later the woman died of pulmonary tuberculosis. The author discusses the general subject of ocular tuberculosis and considers the question as to whether the bacillus was introduced into the system at the time of the first trifling injury or whether resistance was so lowered as to predispose to the infection from a latent tuberculosis.

Park Lewis.

Solarik, Viteslava. Familial degeneration of the cornea, and the endocrine system. *Oft. Sbornik*, 1930, v. 5, pp. 153-156.

The author reports two cases of familial nodular degeneration of the Groenouw type. The first patient, a female aged twenty years, had a small sella turcica and an enlarged thyroid without symptoms of thyreotoxis. The second patient, a male aged fourteen years, had increased metabolism and low blood coagulability. In each case there were multiple nodular opacities in the anterior and middle layers of the cornea. Fluctuation of vision was due to periodic increase and decrease in density of the opacities. The author attributes this to extensive disturbances of the endocrine system. (Two illustrations, bibliography.) *G. D. Theobald.*

Thamm, Walter. Marginal furrow and corneal ectasia. *Klin. M. f. Augenh.*, 1931, v. 87, July, p. 44 (ill.).

The formation of a marginal furrow in the left cornea of a patient aged fifty-two years, and in the right cornea in association with marginal ectasia, was due to fatty degeneration. Therapy is of no avail. But against the two chief dangers of this degenerative

process, namely, perforation and a high amount of astigmatism, excision or cauterization of the ectatic part and covering with a conjunctival flap has been recommended. *C. Zimmermann.*

Tirelli, Gaspare. Parenchymatous luetic hereditary keratitis with posterior corneal ulcer. *Arch. di Ottal.*, 1931, v. 38, Jan., p. 38.

After many experiments the author concludes that the syphilitic virus travels via the uvea and corneal substance and subsequently causes a lesion of the endothelium. This lesion should be regarded as a sequela rather than the cause of the corneal disease. The alteration and rupture of Descemet's membrane is due to the action of some histolytic ferment originating from the leucocytic and lymphocytic deposits on the membrane.

David Alperin.

Valière-Vialeix, V. Frequency of parenchymatous keratitis in ophthalmic herpes. *Ann. d'Ocul.*, 1931, v. 168, May, pp. 341-351.

Five new cases of ophthalmic herpes are reported with various paralyses, iridocyclitis, and glaucoma complicating the herpes, and one case ending with a typical Argyll Robertson pupil. Parenchymatous keratitis has appeared in a total of seventeen cases, including those now recorded: six showed slight epithelial erosion. Iridocyclitis had been present but there were no synechiae and contraction during convergence was active. This is a rare complication. Ciliary perineural lesions are believed to be responsible.

H. Rommel Hildreth.

Velhagen, J. K. Chinone discoloration of the interpalpebral area of the cornea and conjunctiva as occupational disease in the manufacture of hydrochinone. *Klin. M. f. Augenh.*, 1931, v. 86, June, p. 739 (ill.).

Six cases of brown ribbon-shaped discoloration of cornea and conjunctiva in the interpalpebral area are described in laborers who worked in hydrochinone factories. It is caused by parachinone, which occurs in the form of steam or dust in the factories, and produces

numerous gray dots of infiltration with a brownish luster. The epithelium of the cornea becomes uneven, loose, and decays by ulceration, and the sensibility of the cornea is diminished. It is an occupational disease and its prevention demands thorough ventilation.

C. Zimmermann.

Vogels, Annie. **Vortex-shaped dystrophy of the cornea.** *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 591 (ill.).

Both corneas of a woman aged sixty-six years, who complained of gradually decreasing sight within the last few years, showed, in addition to marginal opacities corresponding to gerontoxon, fine vortex-shaped opacities with eccentric terminal points. These consisted (in slit-lamp examination and excised pieces) of minute yellowish-brown dots in all layers. Chemical reactions excluded cholesterolin, lime, and uric acid, but Lugol's iodine solution proved that they consisted of glycogen, whose occurrence in degenerated corneal tissue (leucoma, staphyloma) is well known. This case is the third reported in the literature, all in women. In all probability it is a special and typical form of a rare dystrophy of the cornea.

C. Zimmermann.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Behr, Carl. **Participation of both antagonists of pupillary action in the different reactions of the pupil.** *Graefe's Arch.*, 1930, v. 125, p. 147.

Double innervation of the sphincter pupillae muscle in the sense of a parasympathetic-inciting and a sympathetic-inhibiting innervation does not exist in man. This finding is contrary to the contention of Poos, who asserts that the sympathetic causes inhibition of the sphincter. Since in mydriasis from psychoreaction there first occurs a strong contraction of the dilator without change in the tonus of the sphincter and only after an increased dilating reaction does diminution of tonus occur in the sphincter pupillae, it must be concluded that inhibition of tonus in

the sphincter comes about exclusively from diminution of tonus in the parasympathetic.

H. D. Lamb.

Blatt, Nickolaus. **Disturbances of accommodation after iridocyclitis.** *Graefe's Arch.*, 1930, v. 125, p. 125. (See Section 3, Physiologic optics, refraction, and color vision.)

Elschnig, H. H. **Detachment of the retina subsequent to detachment of the choroid.** *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 595. (See Section 10, Retina and vitreous.)

Pellathy, B. **Retinal detachment and congenital uveitis in three siblings.** *Zeit. f. Augenh.*, 1931, v. 73, Feb., p. 249. (See Section 10, Retina and vitreous.)

Poos, F. and Sartorius. **Experimental findings in the tuberculotoxic origin of sympathetic ophthalmia (Guillery).** *Graefe's Arch.*, 1930, v. 124, p. 565.

The authors were able to verify in principle the views of Guillery regarding the associated reaction of the second eye after the introduction of a capsule containing tubercle bacilli into the vitreous of the first eye. This associated reaction in the second eye was observed by the present authors only when a true tuberculosis had developed in the first eye. On the basis of their own experimental material, the authors could see no indication for a tuberculotoxic origin of sympathetic ophthalmia in the sense of Guillery. Conditions in the eye with the capsule were far different from the changes of sympathetic inflammation and really presented the picture of a toxic endophthalmitis. It was found that with a retrobulbar location of the capsule, an injury to the first eye was not essential in the production of an associated reaction in the second eye. After the introduction of the bacillus-containing capsule into an orbit from which the eyeball had been removed, the same histologic changes occurred in the second eye. In severe chronic experimental tuberculosis in rabbits, an injury to the ciliary body was not followed by a progressive toxic uveitis.

The associated process in the uvea of the second eye in the experiments with the capsule should be conceived as part of a general toxic disturbance of the entire reticuloendothelial system by small amounts of the poison and as having nothing to do with the hypotheses and processes of human sympathetic ophthalmia.

H. D. Lamb.

Schonenberger, Hans. **Sympathetic ophthalmia after Elliot's trephine operation; with histologic findings.** Graefe's Arch., 1930, v. 125, p. 29. (See Section 8, Glaucoma and ocular tension.)

Wostry, Milos. **Glaucoma and iritis.** Oft. Sbornik, 1930, v. 5, pp. 141-146. (See Section 8, Glaucoma and ocular tension.)

8. GLAUCOMA AND OCULAR TENSION

Alajmo, B. **The actual state of the modern physiochemical doctrine of glaucoma.** Arch. di Ottal., 1930, v. 37, March-April, p. 111, and May, p. 145.

The author describes the theory of dissociation and electric ionization (Arrhenius), that is, the concentration of the hydrogen and hydroxyl ions. He tries to show that a relationship exists between the pH of the blood and that of the aqueous humor, and also that there is a relationship between the pH of the aqueous and the intraocular pressure. Alkalinity of the vitreous corresponds to an increase, and acidity to a decrease of the intraocular pressure. Redslob and Reiss injected 0.03 c.c. of an isotonic phosphoric acid solution in an eye affected with primary absolute glaucoma (100 mm. of mercury, Schiötz), in which miotics and surgery (iridectomy and sclerectomy) had failed. The tension, after a few oscillations between high and low, remained at 13 mm. The author proposes to determine in the future whether the lowering of the pH in the vitreous could not be better obtained by the introduction of hydrogen ions through an electric current (iontophoresis) instead of acid injections into the vitreous.

From these experiments the author has arrived at the following conclusions: No reduction in intraocular tension could be noticed in experimental acidosis by mouth; however, intraperitoneal injection of monosodium phosphate and acetone resulted in a definite lowering of pressure after two to six hours. The subconjunctival injection of salt gave after one hour definite hypotension, which was maintained for several days. More marked results were obtained by injecting the acid salt in the vitreous body, in which case hypotension was extended from thirty to forty days. In all experiments the other eye was used as a control, Ringer's solution being injected without any appreciable change in the intraocular tension. The article contains a very interesting array of contradictory statements of workers in this field as to the variation of the pH in normal and "glaucomatous" blood.

The hydrophilic characteristic of colloids, such as the vitreous, represents the essential feature in the pathogenesis of glaucoma. A disturbance in the calcium and potassium equilibrium (calcium deficiency) is found in glaucoma. The conclusion of the author is that we should assume an eclectic attitude. We must consider other factors such as vascular dystrophy in addition to colloidal hydrophilia in studying the pathogenesis of glaucoma. The pathogenesis of glaucoma although complex is not obscure.

David Alperin.

Diaz Dominguez, Diego. **Intraocular tension following the placing of weights on the globe.** Ann. d'Ocul., 1931, v. 168, June, pp. 446-455.

The curve of intraocular tension taken every five minutes in a girl of twenty-five years and a woman of seventy years gradually rose from zero to normal in over an hour's time. A 250 gm. weight was placed on the lateral surface of the sclera for five minutes, at the end of which time the tension was zero. These eyes were normal. The curves were explained by loss of aqueous through the drainage spaces and gradual reaccumulation.

In a series of glaucomatous eyes similarly measured the tension did not fall to zero and a secondary rise of tension followed, going higher than the initial tension. A case of chronic simple glaucoma showed a drop from 40 to 10 mm. after five minutes, to rise again to 70 mm. at the end of twenty-five minutes.

Several types of glaucoma were studied and the curves took somewhat different forms. *H. Rommel Hildreth.*

Duke-Elder, P. M., and Duke-Elder, W. S. **Studies on the intraocular pressure**, part 2. *Jour. Physiology*, 1931, v. 71, no. 3, Mar., p. 268.

Physicochemical factors controlling intraocular pressure were studied. From the authors' experiments it is concluded that:

(1) The intraocular pressure falls with an increase in osmotic concentration of colloids in the blood, and rises with decrease in their concentration.

(2) The intraocular pressure falls with increase in the osmotic concentration of the crystalloids in the blood, and rises with decrease in their concentration.

(3) Within the limits of changes in the reaction of the blood confined to one unit of pH on either side of the normal reaction, the intraocular pressure falls with increase of acidity, and rises with increase of alkalinity.

The mechanism of these changes is discussed: they are all compatible with the theory that the aqueous humor is a dialyzate of the capillary blood, and that the vitreous body is a hydrophilic gel. *M. E. Marcove.*

Fleischer, Bruno. **Schiötz tonometer X with convex cone**. *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 629.

The convex cone has the advantage that it suffices in all measurements without further weights. The results are reliable and constant, so that the instrument is especially useful for practice. It is manufactured by A. Tandberg, Oslo. *C. Zimmermann.*

Franta, J. **Water and salt metabolism in primary glaucoma**. *Oft. Sbornik*, 1930, v. 5, pp. 132-140.

Franta studied the course of water and salt diuresis in eleven cases of primary glaucoma, and in six normal controls. For several days prior to the tests, patients were put on a standardized diet, carefully measured and weighed. For at least twelve hours before tests were made, no liquids or food were taken. Tests began at 8 a.m. and ended at 4 p.m. Each patient was given definite amounts of sodium chloride and water, either in one large dose or in hourly divided doses. Urine and blood serum were tested for sodium chloride. In nine cases of glaucoma the diuresis and salt excretion were diminished. In three cases diuresis was enormously diminished. On account of the small number of cases the author draws no conclusions. (Bibliography.)

G. D. Theobald.

Gala, Antonin. **Relationship of experimental hypertony to ocular tension**. *Oft. Sbornik*, 1930, v. 5, pp. 71-74.

Severing the vagus nerves in rabbits, Gala produced arterial hypertony. Tension was measured with a Schiötz tonometer before and after the operation, and in subsequent observations. After a sudden high arterial hypertony, no increase of the tension of the eye was observed. In some cases there was a decrease in tension, which the author attributes to the diminished flow of blood, owing to the ligation of both internal carotid arteries (a procedure necessary in ligating the vagus). During the further duration of the hypertony (the longest period of observation being eight months) the eyes retained normal tension.

G. D. Theobald.

Hamburger, Carl. **How can histamin (aminglaucosan) be freed from its disagreeable properties?** *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 631.

Five years ago Hamburger recommended histamin in 5, 7, or 10 percent solution as the strongest miotic for acute glaucoma. The expectations have not been fulfilled on account of the se-

vere irritations produced. He now uses a mixture of histamin-dextrin applied by means of iontophoresis on the exposed sclera close to the limbus after elevation of the conjunctiva, for from 1 to 1.5 minutes. This method seems to open perspectives for medicinal influence on the choroid, retina, and vitreous body.

C. Zimmermann.

Klauber, E. Fall of tension after retrobulbar alcohol injection in glaucoma, with retention of vision. *Oft. Sbornik*, 1930, v. 5, pp. 163-164.

In a female aged sixty-five years, acute glaucoma in an eye which had a swelling cataract was controlled by iridectomy. Later when the cataract was hypermature the eye developed an acute irritant glaucoma. Light perception was reduced to three meters. After two injections, each of 1 cm. seventy-five percent alcohol, into the ciliary ganglion, the pain disappeared, and the tension dropped permanently from 50 mm. Hg to 12 mm. Hg. Without extraction of the cataract the acuity of vision increased with the help of the old iris coloboma (with +5.00 D. lens) to 4/60. It may be that the alcohol injection inhibited the sympathetic fibers in the ciliary ganglion, causing the same effect as extirpation of the cervical sympathetic ganglion.

G. D. Theobald.

Kotlarevskaia, S. Z. On the correlation between pigmentary retinitis and glaucoma. *Arch. Oftalmologii* (Russian), 1931, v. 8, pt. 1-2, pp. 159-162. (See Section 10, Retina and vitreous.)

Lörtscher, Max. Comparative examination of the tonometers of Fick-Livschitz and Schiøtz. *Klin. M. f. Augenh.*, 1931, v. 86, June, p. 753 (ill.).

Lörtscher's investigations indicated that the inaccuracy of the Fick-Livschitz tonometer very much impaired its clinical value and that there was no reason to give it, on account of its more tolerable application on the eye, preference over the tonometer of Schiøtz.

C. Zimmermann.

Mazal, Vladimir. Glaucoma in the syphilitic. *Oft. Sbornik*, 1930, v. 5, pp. 126-131.

Of ten syphilitics treated at the Brunner clinic during the past eight years on account of primary glaucoma, only one reacted to antisyphilitic treatment by diminution of the intraocular tension, and by improvement of visual acuity and of the visual field. The probability of syphilitic etiology of the glaucoma in this patient was very great, but owing to simultaneous pilocarpin treatment it was not certain. The remaining nine cases required surgical interference, despite the specific treatment.

G. D. Theobald.

Müller, H. K. The limits of normal intraocular pressure as measured by the Schiøtz tonometer. *Arch. f. Augenh.*, 1931, v. 104, May, pp. 89-101.

From his work, Müller concludes that the normal intraocular pressure is limited between 12 and 36 mm. Hg. All intraocular pressures outside these limits are undoubtedly pathological. These limits apply only where the pressure has been taken with the Schiøtz tonometer and the reading determined from the curve of 1924.

Frederick C. Cordes.

Nicolato, A. Posterior sclerotomy in the cure of secondary glaucoma with complete posterior synechia. *Arch. di Ottal.*, 1931, v. 38, April, p. 162.

The author advocates this operation in case of absolute glaucoma, when enucleation becomes otherwise imperative. The advantage is the freedom from injury to the ciliary body. The sclerectomy is done with the Elliot trephine in the equatorial region about 1 cm. behind the ciliary body after making a conjunctival flap. The presenting choroid is punctured with a Graefe knife, and the conjunctival flap is sutured.

David Alperin.

Pickard, Ransom. Glaucoma and low tension disc cup enlargements. *Brit. Jour. Ophth.*, 1931, v. 15, June, p. 323.

This contribution contains the comparative observations of the author on

44 cases of glaucoma and 37 low tension cases. The origin of the low tension cases and the clinical course of the two conditions are discussed. Four graphs are presented. The low tension group is a glaucomatous group with the initial balance of forces set, as it were, on a lower scale, into which as a disturbing element comes an increase of tension which, though bringing the total to less than 27 mm. Hg (Schiotz) is sufficient to cause glaucoma. Three conditions are assumed in this argument, all of which have to occur together, (1) tension much lower than the average, (2) optic disc of weaker resistance than the average, (3) a rise of tension enough to produce glaucoma but not reaching to 27 mm. Hg.

The author suggests that the term "glaucoma" be reserved, as formerly, for cases of increased tension. "Cavernous atrophy" as used by Schnabel has merit in indicating low tension cases, but the author believes that although "pseudoglaucoma" has been restricted to certain congenital conditions of the disc cup, it may be a good name to apply to this group of enlarged cups in adults without distinct rise in intraocular tension. *D. F. Harbridge.*

Sallman, L. and Deutsch, A. **The clinical importance of the daily curve of intraocular tension and of functional tests in glaucoma.** Graefe's Arch., 1930, v. 124, p. 624.

The cause of the daily variations of ocular tension fully described by Köllner and Thiel might be associated with the function of the external eye muscles. Notwithstanding the great diagnostic significance of observation of the ocular tension in the early morning, observation of the tension in the evening is not to be neglected, for the cases of primary glaucoma with increase of tension in the evening are not so rare as is generally thought. Seidel's test in the dark is a valuable contribution to diagnostic aids for eyes suspected of glaucoma. Differentiation is to be made between high increase of tension as described by Seidel and Serr and the small increases of tension after

a stay in the dark. For the latter the suppression of muscular action during the experiment might afford a definite explanation. In addition to the dark-test, the test with caffein in cases suspected of having glaucoma is useful. Subconjunctival injection of caffein is a substantial supplement to the dark test, for it may establish glaucoma when no pathologic increase of tension occurs with the test in the dark. The remaining functional tests (fluorescein injections, rise of tension when the head drops down from the horizontal with the subject reclining, and variations in tension according to changes in external temperature) were not found in the authors' observations to be practically valuable. The test with amyl nitrite and that with sodium chloride have not yet been sufficiently investigated. Neither the test in the dark nor any of the other functional tests gives any indication for definite operative procedure or any useful conclusion concerning prognosis from operation.

H. D. Lamb.

Schmidt, K. **The glaucoma problem and the capillary endothelium test of Marx.** Arch. f. Augenh., 1931, v. 104, May, pp. 102-109.

Schmidt feels that inasmuch as Loebbeck did not repeat the work, he is not in a position to criticize his (Schmidt's) work on glaucoma and the capillary endothelium test of Marx. The author did not contend that capillary endothelium disturbance was the cause of glaucoma, but that in many cases of glaucoma a capillary endothelium disturbance was present, for which no basis was found on general physical examination. Schmidt is convinced that he has proven that there is a vascular disturbance present in every case of glaucoma. *Frederick C. Cordes.*

Schönenberger, Hans. **Sympathetic ophthalmia after Elliot's trephine operation; with histologic findings.** Graefe's Arch., 1930, v. 125, p. 29.

Up to the present report only three cases of sympathetic ophthalmia after Elliot's trephining have been described

in the literature. The essential clinical and histologic findings in these three cases are reviewed. Three more cases that occurred in Vogt's clinic in Zurich are then considered. In a woman fifty years old a trephining was done on the left eye, and eight days later a sclerotomy; there soon followed an iridocyclitis in the operated left eye. One month after the first operation it was found that the right aqueous was very cloudy and contained shreds of fibrin; many precipitates were present on the posterior corneal surface and the pupil was small and filled with exudate. The immediately enucleated left eye was found to have infiltration of the entire uvea with round cells intermingled with scattered epithelioid cells; but nodules of epithelioid and giant cells were not present. The histologic picture consequently coincided with what is generally regarded as the beginning stage of sympathetic ophthalmia. The final result in the sympathizing right eye was total loss of vision.

The second patient was a fifty-four-year-old woman in whom on an alleged blind right eye a puncture was done and later an Elliot trephining. Six weeks later a redness began in the unoperated left eye, and it gradually increased. Seven and one-half weeks after the trephining, the right eye, which then presented an intensive ciliary injection and precipitates, was enucleated. In the left eye at that time a little dust was found on the posterior corneal surface, with two efflorescences of the iris as well as considerable remains of synechiæ. The histologic findings in the enucleated right eye were a small-cell infiltration with nodules of epithelioid cells in the choroid and no giant cells. The iris and ciliary body were very slightly infiltrated.

In the last patient, a woman sixty years old, each cornea measured only 10 mm. in diameter. The patient stated that two years after the right eye had been trephined first this eye had become reddened and then the left eye. In the second year after the operation, the operated right eye was soft and had

dense iris pigment and remains of exudate upon the anterior lens capsule. The nonoperated left eye presented little exudate and pigment upon the anterior lens capsule. In the following eighteen months, many fine precipitates developed in the right eye and only a few precipitates upon the posterior corneal surface in the left eye. The right eye, enucleated at this time, presented no changes indicative of sympathetic ophthalmia. *H. D. Lamb.*

Sloan, L. L. **The paracentral field in early glaucoma.** *Arch. of Ophth.*, 1931, v. 5, April, pp. 601-622.

The scotomas of incipient glaucoma may be easily overlooked, as they are frequently only relative and are often separated from the blind spot. They are also of a transient nature, so that attempts to confirm their presence result in failure. At times they are found in characteristic form in conditions other than glaucoma. Their true nature, if glaucomatous, however, may be determined, as suggested by Samojloff, by observing their disappearance or reduction in size, following the use of pilocarpin. These observations have been reported as early indications of the onset of glaucoma. *M. H. Post.*

Swett, Wilber F. **A new operative procedure in glaucoma.** *Arch. of Ophth.*, 1931, v. 5, April, pp. 634-635.

The iridectomy being completed subconjunctivally, the iris tissue removed is floated out on physiologic solution of sodium chloride. A small section is picked up on a repositor and is inserted into the angle of the incision, where it is held firmly by the lips of the wound. It never becomes dislodged. Holth has practiced a similar method.

M. H. Post.

Szasz, A. **The influence of medicinal treatment on "reactive hypertension".** *Arch. f. Augenh.*, 1931, v. 104, May, pp. 154-166.

By reactive hypertension, the author means the temporarily increased intraocular tension that follows the refilling of a previously emptied anterior cham-

ber. In older rabbits, this active hypertension develops more slowly and does not reach so high a level as in younger animals. Pilocarpin hastens the time of the appearance of the reaction and helps to produce a higher tension, while eserin only increases the degree of reaction. Arekolin, yohimbin, and pelletierin do not influence the time but do produce a higher tension.

Frederick C. Cordes.

Vasek, E. **Are the results of the Holth fistula operation for glaucoma permanent?** *Oft. Sbornik*, 1930, v. 5, pp. 165-170.

Permanent results were obtained in seventy-two percent of forty cases of chronic primary glaucoma which were operated on by means of Holth's tangential extralimbal sclerotomy.

G. D. Theobald.

Vejdovsky, V. **Primary noninflammatory juvenile glaucoma.** *Oft. Sbornik*, 1930, v. 5, pp. 147-149.

A fourteen-year-old girl had headaches and pain in both eyes accompanied by loss of vision for three months. The ciliary vessels were slightly dilated, anterior chamber shallow, pupils dilated, both discs excavated. Treatment consisted of subconjunctival injections of adrenalin and instillations of pilocarpin and eserin. Vision was increased within three months, R. from fingers at 4 m. to 5/15; L. from fingers at 1 m. to 5/25. The patient refused further treatment, and returned fourteen months later with absolute glaucoma. The author associates the disease with puberty, as menstruation was late, appearing after the fifteenth year. The general condition and history were negative.

G. D. Theobald.

Weekers, L. **Experimental ophthalmotonic reaction provoked by the orbital injection of various substances.** *Arch. d'Opht.*, 1931, v. 48, May, p. 321.

The intraorbital injection of 1 c.c. of twenty per cent sodium chloride in a rabbit produced a rapid rise in tension to 48 mm. of mercury (Schiotz) within one hour. After twenty-four hours the

tension dropped to 10 mm. and remained subnormal for seven days. Injection of ten percent sodium chloride produced an immediate drop in tension to 17 mm. with a return to normal within three days. The injection of alcohol containing iodine produced a preliminary rise in tension followed by a long period of subnormal tension. The injection of eighty percent alcohol alone or of ten percent dionin produced only a prolonged period of subnormal tension. The basic or acid reaction of a fluid appeared to make no difference in its effect. Apparently very strong irritating substances produce an abrupt rise in tension followed by a prolonged period of hypotension, while more diluted solutions of the same substances give only the reaction of hypotension. The experimental data are given in detail, and the hope is voiced that some clinical applications of intra-orbital therapy will result from this type of experimentation.

M. F. Weymann.

Wostry, Milos. **Glaucoma and iritis.** *Oft. Sbornik*, 1930, v. 5, pp. 141-146.

From 1921 to 1929, nineteen cases of glaucoma secondary to iritis were studied in the Brunner clinic in Brno. The author divides these cases into three groups: (1) iritis serosa glaucomatosa, where a mild iritis is accompanied by an increase in tension; (2) iridocyclitis seroplastica glaucomatosa, with marked changes in the iris and an increasing tension; (3) cases whose symptoms simulate acute inflammatory glaucoma more than iritis.

Fourteen were men, 5 women. Etiology: tuberculosis 5, lues 2, gonorrhea 2, articular rheumatism 1, nephritis 2, climacteric 2, undetermined 5. Ten cases, in which the tension was very high, were treated with subconjunctival injections of 0.2 to 0.3 c.c. adrenalin, in conjunction with miotics. Four cases, in which inflammatory symptoms predominated, were treated with the adrenalin injections in conjunction with mydriatics. Five cases were operated on, as the conservative treatment was a failure (puncture or

sclerotomy and eventually iridectomy). Atropin can be administered only when tension is carefully controlled.

G. D. Theobald.

9. CRYSTALLINE LENS

Gnad, Franz. **On microphakia.** Klin. M. f. Augenh., 1931, v. 87, July, p. 33.

A girl aged five years showed bilateral congenital relative and absolute smallness of the lens with megalocornea. The anterior pole of the left lens touched the posterior surface of the cornea, with central abolition of the anterior chamber. The right anterior chamber was deep, numerous threads of pupillary membrane crossed the pupil, and the iris and lens were tremulous. In homatropin mydriasis of 8 mm. the border of the lens was everywhere separated from the pupillary margin by a space of 1 mm. Pilocarpin decreased the tension of the right eye, but caused pain in the left, apparently because by the miosis the iris was so pressed upon the lens touching the cornea that the communication between anterior and posterior chambers was blocked. In the assumption that this would overcome the increased tension, the left lens was extracted successfully, and later also that of the right eye. The lenses weighed 0.1226 and 0.1223 grams (normal 0.16 and 0.174). Beside their small size their spherical shape was striking. Abnormal smallness of the lens anlage is the most probable explanation of the etiology.

C. Zimmermann.

Hornback, E. T. **Hereditary cataract.** Jour. Missouri State Med. Assoc., 1931, v. 28, March, p. 113.

The author has reported an unusual case history and family tree in which two first cousins married, the eyes of both being normal. From this union, five of the nine offspring developed cataracts between the ages of forty-eight and sixty years. Twelve of the twenty-four born in the next generation had cataracts. All were under fifty-one years of age, and eight of the twelve were under forty when the cataracts appeared. In the next genera-

tion, ten out of forty-one developed cataracts, the oldest at the age of twenty-nine years, and five before they had reached the age of fifteen years.

M. E. Marcove.

Kirby, Daniel B. **Calcium in relation to cataract. 1. In vitro.** Arch. of Ophth., 1931, v. 5, June, pp. 856-867.

Owing to the natural situation of the lens in vivo, that is, not dependent upon direct circulation of the blood, but rather upon the aqueous humor, it is best adapted of all body tissues to experiments in vitro. It should be possible to synthesize the aqueous humor, and, using such a fluid, with the other conditions made similar to those in vivo, cause it to live and maintain its transparency outside of the body for an indefinite period. Experiments on living lens epithelial cells were made by decreasing and increasing the calcium content of the experimental media. No toxic changes occurred until the calcium was increased to the point where precipitation of the calcium compound took place, but relatively slight reduction of the calcium content resulted in toxic effects on the cells. A normal aqueous humor probably contains only ionized and nonionized diffusible calcium. The reduction in the experimental media was in the ionized diffusible portion. The different humors of the body vary in their calcium content and in the ratio of calcium to potassium, and the humors differ greatly from the cells and tissues. A certain parallelism was found between the calcium and potassium ratio of the red blood corpuscles and the crystalline lens, as compared to the blood serum, aqueous, vitreous, spinal fluid and other fluids used in physiological experiments, but in cataract the ratio reverses somewhat. The experiments on the calcium-potassium ratio in vitro are insufficient for drawing any definite conclusions, but it is interesting to note that the membrane of the lens allows a large amount of potassium and a very small amount of calcium to enter the lens.

M. H. Post.

Kirby, Daniel B. **Calcium in relation to cataract. 2. In vivo.** Arch. of Ophth., 1931, v. 5, June, pp. 868-883.

This study was undertaken in order to clarify a number of questions with regard to it. It was desired: (1) to determine as much as possible concerning the general calcium metabolism of the lens, (2) to ascertain its importance with regard to the metabolism of the lens, (3) to study the possibilities of prevention of cataract from tetany in both infants and adults, (4) to find the reason for the deposition of calcium in senile cataract, (5) to determine whether senile cataract is accompanied by calcium deficiency or excess, and (6) to acquire information with regard to the administration of calcium or parathyroid extract in cases of senile cataract.

It is found that the calcium in the aqueous represents the ionized and nonionized diffusible fraction of the total calcium of the blood plasma. There is only a very small amount in the crystalline lens, but it is of great importance. It is greatly increased in senile cataract. Its deficiency in infantile tetany undoubtedly plays a part in the development of cataract. The calcium deficiency of rickets, however, does not result in the production of cataract. Thirty-eight cases of cataract following tetany have been found in the literature and from them the important points to be learned are, that parathyroid tissue must not be removed during thyroid operations, and that early treatment must be instituted where parathyroid insufficiency is discovered, even though this latter type of case is frequently only temporary in character. Reduction in the serum, aqueous, and lens calcium with electrochemical changes, and disturbance of equilibrium of the inorganic elements in the lens, which causes changes in the labile colloidal solution of the lens protein, are the factors responsible for the lens opacity. Once they are established, the administration of calcium and parathyroid extract will not prevent the development of the cataract, though it may not always progress to complete

opacity. In the senile type of cataract, the calcium found in the lens is probably the result of the slow death of the lens, and the degeneration of its protein with lipid by-products; local concentration, due to absorption by the large molecules of the lipoids; and finally, deposition of this calcium by a change in the pH toward the alkaline side. There was no suggestion of tetany in the series of cases of senile cataract studied. No evidence of calcium deficiency was found, as far as the blood serum values were concerned, in two series of cases. The calcium intake and output were also studied, showing that the patients were in perfect or slightly positive balance when on a neutral or slightly alkaline diet, but negative when on an acid residue diet, or when receiving injections of parathyroid extract; that is, they were responding normally. There was no indication for the use of calcium salts in the presence of senile cataract, nor, indeed, in the administration of parathyroid extract.

M. H. Post.

Kirby, Daniel B. **Senile cataract: the use of parathyroid extract.** Arch. of Ophth., 1931, v. 5, May, pp. 754-759.

It was thought at one time that patients with cataract should be kept in a mild state of hypercalcemia. Although such patients had more than sufficient calcium in the blood, an insufficient amount was diffusing into the aqueous. In the early stages there was excess calcium in the aqueous and the parathyroid extract was calculated to increase secretion and remove this excess.

Six patients were treated by the author. None of them showed improvement and there was no absorption of cataractous material. The serum calcium rose slightly after the injections. Parathyroid extract in the form of parathormone, which had been found most potent and reliable, was used. This agent, however, is excellent in deficiency in calcium, where calcium and parathyroid therapy is indicated.

M. H. Post.

Köteles, Marie. **Experiences with euphakin.** *Klin. M. f. Augenh.*, 1931, v. 87, July, p. 70.

Some observations suggest that senile cataract may have a connection with diminished activity of the parathyroid glands. Thus Siegrist began his experiments with endocrine extracts. The experiences of Köteles correspond with those of Siegrist. The opacities did not clear up during the euphakin treatment, but their progress was arrested. Suitable are all incipient cataracts with only peripheral opacities and vision not less than 5/10 or 5/15. Phacosclerosis was not influenced by it. It cannot yet be decided whether euphakin can prevent the formation of cataract. But in old people or very ill or very much weakened patients euphakin treatment is to be recommended, as probably operation will be avoided and sufficient vision retained. *C. Zimmermann.*

Lancaster, W. B. **The cataract operation.** *Surgery Gynec. and Obstet.*, 1931, v. 52, Feb., p. 452.

From the point of view of reducing operative complications, the preliminary preparation, anesthesia, and akinesia are discussed in detail. The author's modification of intracapsular extraction is stressed. (Discussion.)

M. E. Marcove.

Michail, D. **Opacities of the lens produced by direct contusions.** *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 606 (ill.).

Three cases of injury by penetrating pieces of iron, powder, and granite are described. They all showed that direct contusions of the lens by foreign bodies sliding tangentially on its surface produce fine capsular opacities by alteration of the capsular epithelium, which according to the histological investigations of Hess, Schirmer, and Leber consist in a degeneration of the epithelium of the lens of the directly injured area, accompanied by proliferation of the cells in the neighborhood. These are only visible with the slit-lamp and do not impair vision, although they oc-

cupy a larger area than the injured region and are permanent.

C. Zimmermann.

Nordmann, Jean. **Concerning certain forms of rosette cataract.** *Arch. d'Opht.*, 1931, v. 48, June, p. 392.

One case of rosette cataract followed a blow, and the sutures of the lens did not appear in the rosette as veins in a leaf, but separated the rosette into separate petals.

A second case was found in an eye in which the only injury had been the lodgment of a small foreign body on the cornea. In this case a nontraumatic origin of the cataract was considered possible, because the injury was not assumed to be sufficient to produce it.

The evolution of these cataracts is considered and the common belief that they first appear directly under the capsule after an injury and then migrate deeper into the lens through the ingrowth of new fibers between the opacity and the capsule is substantiated by a case in which the opacity was found directly subcapsular after a blunt injury. The importance of this knowledge from the legal aspect was emphasized in the case of a chauffeur who claimed disability from an injury. A rosette cataract was found in the deeper cortical layers but the patient's history showed that he had had a frontal sinus operation seven years before. From the deep location of the opacity it was assumed that it was due to injury at the time of operation and not to the recent trauma.

The recording of observations over a long period of time upon the depth of these opacities will establish a basis for legal opinions upon the subject in cases of traumatism. The writer's opinion is that this type of cataract most often follows contusion of the globe and that though a nontraumatic type may exist it is rare.

M. F. Weymann.

Nordmann, Jean. **Considerations on the myotonic and endocrine cataract.** *Ann. d'Ocul.*, 1931, v. 168, June, pp. 438-442.

A man aged thirty-one years had myotonia atrophica, localized in the lower part of the face and the thenar and hypothenar muscle groups. The vision was 5/5 and the eyes appeared normal. Because of the general condition a slit-lamp study was made and fine opacities were seen in the anterior and posterior cortex of each lens.

Six years previously the patient had lost considerable weight, not regained, and had had a period of weakness in the hands. The depth of the opacities in the cortex would place this layer six years back as being subcapsular, and suggests an endocrine disturbance as being responsible for the cataract.

H. Rommel Hildreth.

Planta, Peter. **Bilateral serpent ulcer with suppuration of the lens and post-operative panophthalmitis as expression of constitutional inferiority.** *Klin. M. f. Augenh.*, 1931, v. 87, July, p. 39 (ill.).

The left eye of a farmer aged fifty-four years, affected with chronic vitiligo, developed after injury by a foreign body a serpent ulcer of the cornea which did not yield to treatment, so that the pus had to be evacuated through a Saemisch incision. Prolapse of the iris led to secondary glaucoma necessitating iridectomy. This lowered the tension, but on account of increasing pain the eye was enucleated. After five years the right eye was injured, and this event was followed by serpent ulcer which perforated leaving a central leucoma. The incipient senile cataract had now become total. After three months the patient returned with secondary glaucoma. Iridectomy was well borne, but not the cataract extraction a few months later. Histological examination of the lens revealed that it must have been infected in the apparently quiet eye on perforation of the ulcer. Next to the rare condition of the lens the case was interesting on account of the striking lack of resistance to exogenous influences. Perhaps vitiligo, which has been attributed to endocrine disturbance, caused a constitutional inferiority.

C. Zimmermann.

Rubert, J., **Extraction of senile cataract within the capsule in keratoconus.** *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 615.

A case of very marked keratoconus with senile cataract and peripheral changes of the fundus not clearly defined is described. The intracapsular extraction was successful, with vision 16/200 after correction.

C. Zimmermann.

Safar, Karl. **Orange-yellow coloring in the anterior segment after unsuccessful cataract operation.** *Graefes Arch.*, 1930, v. 124, p. 601.

During an extracapsular cataract extraction in a man sixty-seven years old, unexpected movement upward of the eye by the patient in the absence of a traction-suture led to dislocation of the lens and loss of the nucleus into the vitreous. One year later the eye was totally blind and had a tension of -3. A yellow mass lay in the anterior chamber and blood vessels were present in various layers of the cornea. Anatomical examination of the enucleated eyeball showed that the yellow mass in the anterior chamber was the remains of the lens nucleus; the yellow mass was surrounded by a strongly vascularized membrane. On the inner side of this membrane the fatty material lay in large so-called pseudoxanthoma cells intermingled with foreign-body giant cells. To the inner side of this layer there occurred a mass consisting of mononuclear and polymorphonuclear leucocytes with a detritus evidently derived from degenerated lens substance. The latter mass evidently corresponded to the macroscopically visible yellow pulp derived from cortical lens substance surrounding the nucleus.

H. D. Lamb.

Salvati. **Eight years of surgery on the crystalline lens in Egypt.** *Arch. di Ottal.*, 1931, v. 38, April, p. 203.

The operation for cataract in Egypt is complicated by the great prevalence of trachoma, lacrimal diseases, diabetes, and glaucoma, as well as by climatic and dietary conditions. The au-

thor uses simple or combined extraction in two stages with preliminary iridectomy, as being less traumatizing. Trachoma, except when discharge is profuse, is no contraindication to cataract operation. Immaturity after the age of sixty years should not postpone operation, and bandaging as well as immobility in bed are not necessary after cataract extraction.

David Alperin.

Vogt, Alfred. Histological changes of the detached lamella of the anterior capsule (fire detachment) of blacksmith's and glassmaker's cataract. *Klin. M. f. Augenh.*, 1931, v. 86, June, p. 736 (ill.).

Before extracting the lenses of two fire workers who showed in both eyes nuclear and posterior shell cataract with detachment of the lamella of the anterior capsule, Vogt removed from the medium-sized pupil a large piece of anterior capsule with widely opened De Wecker scissors. The lamella was not of the uniform thickness expected from the clinical aspect, but its thickness by far exceeded that of the exfoliated senile lamella, whereby some differences between the two clinical pictures are understandable. Hence the continuity of the lamella of fire workers, which hangs intact in the aqueous, while the much thinner senile exfoliation lamella tends to decay and disintegrate. The intense striation of the fire lamella indicates probable damage of the single lamellæ and their cement substance by radiation or heat.

C. Zimmermann.

10. RETINA AND VITREOUS

Doggart, J. H., and Shapland, C. D. Simple detachment of the retina, with a report on 75 cases treated at Moorfields Eye Hospital by Gonin's method. *Brit. Jour. Ophth.*, 1931, v. 15, May, p. 257.

At the Royal London Ophthalmic Hospital, marks are tattooed at opposite points of the limbus in line with the estimated position of the hole. After anesthetizing the eye, a knotted guiding thread is passed through the

episcleral tissue at the limbal pigment mark remote from the retinal hole side. The ocular conjunctiva is then divided at a point about 0.5 cm. from the pigment mark on the side adjacent to the retinal hole, and is incised for a length of about 1.5 cm., so that the incision is parallel to the tangent to the arc of the limbus at the pigment mark. Tenon's capsule is opened and the sclera bared over the required situation. The guiding thread is passed through a hole punched in the center of the blade of a Desmarres retractor which is used in the conjunctival wound, thus giving access to a wide area of sclera. The guiding thread is then arranged so that it passes from the first tattoo mark across the center of the cornea over the second pigment spot, its prolongation crossing the site of the retinal hole. The predetermined distance of the retinal hole from the limbus is marked on the exposed sclera with a pair of callipers, one point of which has previously been dipped in sterilized India ink. Two or more conjunctival sutures are inserted in the cut ends of the ocular conjunctiva, and the guiding thread is withdrawn. An electric cautery at white heat then sears a way through the sclera at the point determined and, as soon as the subretinal fluid has escaped, the cautery is again heated up to a white heat, plunged through the opening in the sclera so made, and immediately withdrawn, the average depth of penetration being 1 cm. and the duration two seconds. The conjunctival sutures are immediately tied off, the speculum removed, and double bandages applied.

On the fourth day after operation the lids are cleaned and a drop of two percent atropin instilled into the affected eye, after which both eyes are again bandaged. On the eighth day a further drop of two percent atropin solution is put into the operated eye, the conjunctival sutures are removed and the fundus is examined. If the detachment is as extensive as before operation and there is no sign of improvement, the bandages are not reapplied and the patient

is permitted to get up. If on the other hand the detachment is less extensive, or if the retina is in place, then both eyes are again bandaged and absolute rest secured for a further three days, after which the affected eye is again atropinized and its fundus examined. Whatever the condition of the retina, the patient is allowed up, and both eyes are uncovered. Five illustrative cases are recorded together with four sets of fields showing before and after operation.

During the year 1930, 75 cases of retinal detachment were submitted to the operation of cautery puncture by Gonin's method at the hospital. Of these 75 cases, 24 were discharged with the retina reattached, and the visual field full; 12 showed improvement in visual acuity; and the remaining 39 were either unchanged or made worse.

D. F. Harbridge.

Elschnig, H. H. Detachment of the retina subsequent to detachment of the choroid. *Klin. M. f. Augenh.*, 1931, v. 86, May, p. 595 (ill).

The left eye of a man aged forty-two years, who complained of visual disturbances for a week, showed inward and downward a large smooth rigid bulging of the retinas with characteristic delineation of the ora serrata and ciliary body, which was taken for a subchoroidal cyst. Corresponding to its greatest prominence the sclera was opened 2 mm. wide and 5 mm. long and a perfectly clear fluid without any admixture evacuated. The flap and the conjunctiva were closed by previously placed sutures. After two months vision was 6/8, and the lower portion of the retina was scattered with pigment dots. The author assumes a primary detachment of the choroid of unknown etiology, which became complicated by detachment of the retina. This does not

seem to have been observed after post-operative detachment of the choroid.

C. Zimmermann.

Fisher, J. H. A note on Gonin's operation for detached retina. *Brit. Jour. Ophth.*, 1931, v. 15, June, p. 317.

This observer believes the expression "sealing the hole" to be inappropriate; "exclusion of the hole" by ring synechia between retina and choroid perhaps best expresses the state of affairs. Occlusion of the hole seems to the author impossible for the following reasons: (a) difficulty in determining the exact point overlying the retinal hole, (b) cooling of the cautery in penetrating sclera choroid and fluid, (c) the extreme thinness of the retina, which is little likely to produce inflammatory exudate, and (d) the absence of retinal thickening, which precludes prevention of permeability to fluid.

When Gonin's operation succeeds it does so because if the site of puncture has been determined with sufficient accuracy the retina falls back into apposition with the choroid, as the subretinal fluid drains out, in such a way that the portion in which the hole exists corresponds with the site of puncture; the choroid at this point responds to the stimulus of the cautery, pours out an inflammatory exudate which organizes and firmly attaches the adjacent part of the retina, and in doing so forms, as it were, an annular synechia for the retinal hole. Some subretinal fluid, no doubt, remains at first, so that the retina is now ballooned toward the vitreous; this residue of subretinal fluid will in a short time be carried off by the lymphatic and vascular channels of the choroid, until the whole of the detached portion of the retina is replaced; and the "ring synechia" prevents it being renewed by fluid from the vitreous.

D. F. Harbridge.

NEWS ITEMS

The only news item contributor in this issue of the Journal is Dr. R. C. Gamble of Chicago.

Deaths

Dr. Vite Edgar VanKirk, Pittsburgh; aged forty-four years, died June fifth last.

Dr. James Cyrus Tucker; Beatrice, Nebraska; aged forty-five years, died July third, of nephritis.

Dr. John Brannum Haden, Galveston, Texas; aged sixty; died July nineteenth, at the U. S. Veterans' Hospital, North Little Rock, Arkansas.

Dr. George Street McReynolds, Sr. of Temple, Texas, died suddenly in the Baptist Hospital at Clovis, New Mexico, August 26, 1931. Dr. McReynolds became ill while touring the Western states with his family. He immediately started for home and was removed from the train at Clovis. The cause of death was acute pancreatitis superimposed on a chronic diabetes.

Dr. McReynolds was a native of Kentucky, born in Christian County, February 11, 1872, the son of R. B. and Victoria Boone McReynolds. He was educated in the public schools of Hopkinsville, Kentucky, attended the South Kentucky College there, Tulane University at New Orleans, and was graduated from the College of Physicians and Surgeons at Baltimore in 1898. He interned in the Baltimore City Hospital and the Presbyterian Eye, Ear, Nose and Throat Hospital and subsequently attended many clinics in New York, Chicago, St. Louis, and New Orleans. Dr. McReynolds practiced for two years at Memphis, Tennessee, and in August, 1902, moved to Temple, Texas, where for many years he was associated with the King's Daughters Hospital and Clinic.

He was a member of the Bell County Medical Society, Texas State Society, and American Medical Association; a fellow of the American College of Surgeons, the American Academy of Ophthalmology and Oto-Laryngology, The Texas Ophthalmological and Oto-Laryngological Society, The American Bronchoscopic Society and a past councillor of the Texas State Association and past president of the Bell County Medical Society.

Dr. McReynolds has done much in Texas to develop bronchoscopy. He has demonstrated the removal of foreign bodies from the air passages of the dog over the entire state, and he contributed many articles to the literature of bronchoscopy. He was a brother of Dr. John O. McReynolds of Dallas, Texas.

Miscellaneous

The New York State School for the Blind, at Batavia, laid the cornerstone of the Park

Lewis Hall Saturday afternoon, September the twelfth.

The New York State Commission for the Blind now has a small revolving emergency fund to be used in obtaining immediate treatment for cases of ophthalmia neonatorum when delay in obtaining local funds occurs. Any physician may request such assistance from this commission.

Owing to general conditions, it has been deemed advisable to postpone the Chicago Graduate Course in Ophthalmology for one year. The present plans call for the beginning of the course in September, 1932. Applications will be received by the Secretary, Dr. R. C. Gamble, 30 N. Michigan Avenue, Chicago, Illinois, up to July 15, 1932.

A survey of the New York Association for the Blind was recently made to determine the effect of noise upon blind people. It was found that noise drowns not only the sound of the blind person's footsteps, but also that of the feet of other pedestrians by which he is guided, thereby making it difficult for him to walk in a straight line.

Societies

The Herman Knapp Memorial Alumni Association held its second annual meeting in New York City, June 9, 1931. The afternoon was devoted to a clinical session at the hospital and there was a banquet in the evening. The following officers were elected for the ensuing year: President, Walter S. Atkinson, M.D., Watertown, N.Y., Vice-President, David F. Gillette, M.D., Syracuse, N.Y., Secretary-Treasurer, William F. C. Steinbugler, M.D., New York City.

Personals

A Texas chapter of the Pan American Medical Association was formed at a meeting of Dallas and Fort Worth physicians July fourteenth. Dr. John O. McReynolds was elected president.

To commemorate the extremely valuable work of MacCallan in organizing an ophthalmological hospital service in Egypt, the Egyptian Ophthalmological Society recently unveiled a bust of our London colleague in the gardens of the Giza Ophthalmic Hospital, near Cairo.

Dr. W. H. Luedde, St. Louis, after an illness of several months is greatly improved and is now able to renew his practice.

Dr. Nicolas Blatt, Targu Mures, Rumania, has been appointed Privat-Doxent in Ophthalmology in the Medical Faculty of the University at Bucharest. His first courses will be given in November.